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# **A Risk Analysis of New Zealand's Biosecurity Management System along Three Sea Importation Pathways**

**A thesis  
submitted in partial fulfilment  
of the requirements for the Degree  
of  
Doctor of Philosophy  
from  
The New Zealand School of Forestry  
University of Canterbury  
New Zealand**

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**2010**

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# Abstract

It is widely acknowledged that international trade is a major pathway for the spread of invasive species. International agreements and domestic legislation aim to reach a balance between facilitating trade and providing nations with the right to protect their environmental, public and economic health. This is achieved through the development of standards that prescribe procedures that must be followed before a commodity is imported. Under Section 22 of the Biosecurity Act (1993) Biosecurity New Zealand of the Ministry of Agriculture and Forestry (MAF) develops import health standards for the importation of commodities and sea containers and for the approval and management of transitional facilities.

Under current regulations, before being allowed to enter New Zealand, a sea container must first be accompanied by appropriate documentation for the sea container itself and any contents (this includes cargo manifests, any required treatment certificates for the cargo and cleaning certificates for the sea container itself). Upon arriving in New Zealand the sea container is transported to a transitional facility for inspection and unloaded once biosecurity clearance has been obtained. There are approximately 7,000 transitional facilities (both on and off wharf) throughout New Zealand and inspections are conducted by persons that have obtained accreditation from MAF for inspections (MAF accredited persons).

Based on current importation procedures and other information made available, mathematical models were developed for three sea importation pathways (sea containers, woodpackaging and used vehicles) that involved the inspection of imported units by MAF accredited persons. These models were designed to predict the effectiveness of the current border inspection policies and procedures. Inspection accuracy was found to have the most influential impact on slippage (the rate at which contamination passes through border procedures undetected) along the measured pathways. Under current conditions, an estimated 5.75% of all sea containers, 4.12% of all sea containers containing woodpackaging and 1.63% of all used vehicles that enter New Zealand annually are contaminated in some manner despite having biosecurity clearance. A 3% increase in inspection efficiency reduced slippage to

0.5% of sea containers, 2.16% of woodpackaging and 0.001% of used vehicles entering New Zealand annually.

Given that the accuracy of the inspection was the most influential aspect of the border management procedures, mathematical models were developed to predict the cost of compliance recovered by MAF if all inspections were conducted by MAF inspectors as apposed to MAF accredited persons. Under current regulations the cost of compliance (if MAF inspector conducted inspections of all imported units) was estimated to be \$117.36 million for sea containers, \$35.16 million for woodpackaging and \$5.44 million for used vehicles. Increasing the inspection accuracy to the ideal 100% increased the cost of compliance by 75.36%, 61.96% and 61.92% for sea containers, woodpackaging and used vehicles respectively.

These findings indicate that Government investment in the training of inspectors throughout New Zealand would improve current border detection rates. Under current regulations, the cost incurred by MAF inspectors inspecting all imported units is recoverable. Currently the cost of compliance is approximately 1% of the value of annual imports. These costs are seen by the import sector as part of their daily business and understand that these measures are in place for the long term sustainability of their businesses (Anon. 2005).

# Acknowledgments

A big thanks to my primary supervisor Dr Hamish Cochrane, firstly for convincing me that my small idea was the basis for a PhD and secondly for helping me morph it into something completely different. Thanks for supporting, frustrating and guiding me in a manner that enabled me to achieve what at times seemed unachievable.

Dr Bruce Manley (associate supervisor), thank you for telling me a small idea of mine could be the solution and showing me how to develop the idea into something real. Your guidance, comments and time have been much appreciated.

I would also like to thank Peter Thompson, Shiroma Sathyapala and Brendon Murphy of Biosecurity New Zealand for the data and advice they provided.

Thanks also to the anonymous members of the import sector throughout New Zealand that took the time to see me and answer my questions.

To the New Zealand School of Forestry staff, especially Jeanette Allen, thank you for all the administrative help and support over the years.

To my fellow postgrads, thanks for all the long lunches in the sun, afternoon tea breaks and the occasional trip to the pub. Without these, any postgraduate student would go completely mad.

A major thank you also goes to my parents, Nike and Matt, for all the support and distractions that made all this possible. The time you took to proof read this lengthy work of art and the advice and guidance offered is greatly appreciated.

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# Chapter 1

## Literature Review

*“...So freedom to trade, and the benefits that results, must be balanced against the need to protect people, animals and plants from unacceptable risks to health and safety...”*  
(Anon. 2003a).

### 1.1 Introduction

Ecosystems exist within natural barriers (such as oceans, deserts and mountain ranges) enabling them to maintain delicate equilibria, which evolve over time. The balance maintained within these systems is susceptible to any changes originating from either within the system itself or from external influences (Pirages and DeGeest 2004). The expansion of the human race around the world has lead to the breakdown of these natural or geographical barriers allowing introduced new organisms to affect existing ecosystem (Anon. 2001d, Korniss and Caraco 2005). It is not possible to accurately document the full extent of these influences, but there are examples where the effect has been documented with some care, for example the colonisation of New Zealand by Europeans (Thomson 1922).

The technological advancement of humans enabled them to colonise countries or landmasses which were neither in close proximity nor inhabited by similar organisms (Pirages and DeGeest 2004). These previously closed or isolated ecosystems are now open to external influences through the movement of people, plants, animals and micro organisms. The more recent advances in technology have enabled the rapid expansion of globalisation, alterations in human population sizes and their distribution. These changes have influenced the manner in which humans interact with their environment, disrupting well established and ancient balances within ecosystems (Pirages and DeGeest 2004).

The first reported trade ship departing from New Zealand with built-in freezing machinery carrying mutton destined for London was the *Hinemoa* in 1890<sup>1</sup>. The invention of refrigerated cargo ships in the late 19th century was pivotal in the trade of animals, plants and their products, and to New Zealand's developing economy. With such advancements in trade come the inescapable risks of transmitting pests, diseases and hazards that are associated with animals, plants and their products. As with any central government, one of New Zealand's government's key goals is to protect the life and health of New Zealanders and native and introduced animals and plants (Anon. 2003a).

New Zealand's economic and environmental health is vulnerable to the introduction of unwanted pests and diseases as it relies on its primary production and unique biodiversity. Therefore there is a constant need to provide protection from such introductions through the maintenance and continuous improvement of New Zealand's biosecurity management systems (Lambie 2002). The rapid increase in trade globalisation has exceeded the capabilities of New Zealand's port and airport border control services both in terms of funding and facilities (Anon. 2001c), making 100 % inspection rates at every point of entry unworkable. Consequently, up until the end of 2004, inspections were conducted on a percentage of total imports basis with risk analysis enabling this approach to be more accurate at targeting high risk goods (Green 2000). However, in order to overcome existing inefficiencies, as of January 2005 the Ministry of Agriculture and Forestry (MAF) implemented a 100% (6 sided inspections) external inspection policy for all containers entering New Zealand.

## **1.2 Introductions into New Zealand**

Almost all human societies have long been dependent on the deliberate transport and introduction of plants and animals as a means to satisfy basic human needs (Anon. 2001d), although most such imports failed to successfully establish (Mack and Lonsdale 2001, Korniss and Caraco 2005). Our actions as global plant dispersers can be beneficial, neutral, or detrimental. So establishing plants beyond their native ranges has

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<sup>1</sup> Maritime Records ship index sourced from <http://www.nzmaritime.co.nz>

been not only beneficial but also essential to modern agriculture (Mack and Lonsdale 2001).

Introductions of exotic species of plants and animals by humans have greatly modified New Zealand's ecosystems and are continuing to do so (Goldson 2002). Prior to the European's arrival in New Zealand, Polynesians introduced plants for cultivation, a variety of dog, the Polynesian rat (*Mus exulans*) and at least one species of flea (though this has been debated) (Thomson 1922). Captain Cook first arrived in New Zealand in 1869, where crew collected native samples and although he did not record any intentional introductions, there is reason to believe that during those berths and extended stays in Poverty Bay and Anaura Bay some European seeds and the black rat (*Mus rattus*) were accidentally introduced (Thomson 1922). As there were no records kept, it is not possible to even approximately date the introductions of any species pre-dating 1773. The arrival of Captain Cook at Dusty Sound (and later at Queen Charlotte Sound) in 1773 is the first date at which it can accurately be said that the European introductions of exotic species into New Zealand commenced (Thomson 1922). At those landings, it was recorded that Captain Cook sowed several European seeds, some of which are known to have survived. During the subsequent landings by Captain Cook and other captains they recorded the introduction of species such as pigs, goats, geese, potato, maize, wheat, and others. Although liberations into the wild were not successful, the specimens gifted to the Maori were by in large cultivated with success (Thomson 1922, Crosby 1986). The motives for introducing many of the plants and animals into New Zealand were initially to provide a food source for other vessels; then later for financial gain, sport or for pets (although the latter importations were very infrequent) (Pracy 1962, Cowan *et al.* 1997).

Coinciding with both intentional and unintentional introductions of animals and plants were the introductions of micro-organisms. As with most indigenous peoples, Maori had low immunity due to the absence of the B-type blood, and were free of the pathogens which plagued Europeans, with Captain Cook noting that the Maori were in a fine state of health (Crosby 1986). Captain Cook, his crew and all the subsequent travellers and immigrants introduced many human pathogens including tuberculosis and many sexually transmitted diseases.

The impact that introduced animals and plants had and continue to have on New Zealand ecosystems are of serious concern to conservationists. Of the 54 mammal species that were introduced into New Zealand, 20 species came from England (for example, feral cat (*Felis cattus* L.), and ferret (*Mustela furo* L.), and 14 species from Australia. The Australian brushtail possum (*Trichosurus vulpecula* (Kerr)) was the only introduced species that is common and widespread and did not originate from England (King 1990). As with the initial introductions made by Cook and others, liberations were not always successful in establishing. Both private (acclimatisation societies) and governmental introductions and liberations of many flora and fauna continued as settlers looked to duplicate many of the best features of their homeland. This included 130 different species of birds, of which only 36 established, 54 species of mammal with only 33 species establishing and around 1700 species of flowering plants, and some 1100 species of insects (King 1984).

### **1.3 New Zealand's Border Control History**

Very early in New Zealand's colonial history legislation was passed to cope with animal and plant pests, (which were being introduced along with livestock, seed and plants, and had begun to threaten the productivity of new settlements), and to provide revenue for the developing colony. Most of New Zealand's legislative development, inspection of incoming goods and people and collection of import tax revenue was undertaken by the Department of Customs, New Zealand's oldest governmental department (McGill 1991).

Since its establishment in 1840 the New Zealand Customs Department has undergone many changes, though its fundamental role remains the control over the movement of goods and people across New Zealand's international borders (Anon. 2004). From early on customs officers were charged with multiple duties including Postmaster, Harbour Master, and in some cases, Quarantine Officers, and had the authority to licence bonded stores and auctioneers. All of these duties also involved the collection of funds for the developing colony (McGill 1991). In 1844 the Government introduced a Property Tax (taxing all property and income), abolishing Customs, for the purpose of a fairer more even taxation scheme. However, in 1845 after a severe drop in tax revenue, the Governor repealed the Property Tax and re-established Customs (McGill 1991). The Duties of Customs Ordinance was passed in 1846 by which horses, mules, asses, sheep,

cattle and all other live stock and animals, as well as seeds, bulbs and plants were admitted into New Zealand duty free: although there were no inspections at this period to guard against various pests being introduced along with the stock (Thomson 1922).

The first and most famous surveillance boat to enter New Zealand's Customs service was a cutter called *Hawk*, registered at Auckland on 10 April 1881. Under the command of Captain Henry Parker the *Hawk* operated in the seas out of Auckland, where the vessel intercepted smugglers until 1887, when she was sold. The name *Hawk* became tradition, with patrol boats out of Auckland up to and including the current patrol boat also named *Hawk* (McGill 1991).

In 1858 the Customs Regulations were passed, making provisions for the Department of Customs to be administered by the Commissioner of Customs (the now Minister of Customs). The Customs Regulations (1858) were succeeded by the Customs Act 1913, which updated the legislative basis of the Customs Department. The next legislation passed, which influenced Customs, was the introduction of the Sales Tax in 1933; this legislation was only temporary and was succeeded by the Goods and Services Tax (GST) Act in late 1933. In 1966 the Customs Act 1913 was succeeded by the Customs Act 1966. The Customs Act was repealed in 1996 and was succeeded by the Customs and Excise Act 1996. The Customs and Excise Act 1996 also established the current New Zealand Customs Service (NZCS), which replaced the then Customs Department<sup>2</sup>.

The legislation currently utilised by the NZCS covers all aspects of customs control and border management. This comprises 38 pieces of principal legislation including The Customs and Excise Act 1996, the Customs and Excise Regulations 1996<sup>3</sup>, the Biosecurity Act 1993, the Hazardous Substance and New Organism Act 1996, the Import Control Act 1988, the Misuse of Drugs Act 1975 and the Trade in Endangered Species Act 1989<sup>4</sup>, as well as other relevant border control legislation such as the

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<sup>2</sup> <http://www.customs.govt.nz/about/Our+History.htm>

<sup>3</sup> <http://www.customs.govt.nz/library/Legislation/default.htm>

<sup>4</sup> <http://www.customs.govt.nz/library/Legislation/Principal+Legislation+used+by+Customs.htm>

Conservation Act 1987, the Forests Act 1949, the Marine Pollution Act 1974, the Transport Act 1962 and the Wildlife Act 1953<sup>5</sup>.

## **1.4 The Sea Pathways**

Transporting goods by sea has been the most predominant form of transport since humans began colonising the world. Even today, the majority of commodities are transported in containers via the sea. Given the increase in the movement of sea containers as a result of international trade and globalisation, the risk associated with sea containers has also increased. These risks are the focus of international agreements, national importation regulations and border security.

### **1.4.1 Sea Containers**

Although transporting goods in large containers of various kinds had been used in inland and overseas distribution for many years, only since 1926 were containers widely used by the London Midland and Scottish railways, and since the World War 2 containers have been used in the Great Britain-Ireland trade. Despite the advantages of containerisation being well reported, it was not until the late 1960's that containerisation became internationally used (Hulme 2009). The number of shipping lines using containers grew from only 5 in 1966 to about 200 in 1969, with the International Standards Organisation standardising container size in 1967 (Johnson and Garnett 1971). And today, giant container ships transport containers and their goods between purpose built ports that facilitate the rapid transfer of the sea containers from the cargo ships to road, rail and canal transport for over land transport to their final destination (Hulme 2009).

Given that the majority (approximately 90%) of modern trade is transported around the world in sea containers, increasing globalisation and trade also means an increase in the movement of sea containers. Sea containers are large and can carry a vast number of different commodities from a wide range of origins. Although measures are taken to prevent the movement of unwanted commodities and organisms within and on sea

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<sup>5</sup> <http://www.customs.govt.nz/library/Legislation/Other+Relevant+Border+Protection+Acts.htm>

containers, smuggling and contamination still occurs. The number of sea containers entering New Zealand increases yearly (see Chapters 3 and 8) therefore there is a constantly growing need to develop more efficient methods of inspecting and treating sea containers.

In addition to the risks associated with the actual movement of commodities in containers; there are also acknowledged biosecurity risks associated with the vessels themselves (e.g. by their ballast water, haul fouling and sea chest and internal piping contamination) (Hewitt *et al.* 2004). The ballast water risks are managed through the exchange of ballast water in international water before the vessel enters into New Zealand waters. Haul fouling risks are minimised through the speed at which the vessels travel, however, haul fouling has been an acknowledged biosecurity integrity gap both in New Zealand and internationally, especially in terms of sea chest and internal pipe contamination (Hewitt *et al.* 2004).

The Marine Biosecurity Team of the Ministry of Fisheries (MOF) was established in 1998 and had the responsibility of reducing these integrity gaps for New Zealand. However in 2004, the responsibilities of the Marine Biosecurity Team were transferred to MAF Biosecurity New Zealand. A function of managing New Zealand's borders involves auditing existing border control measures, and where appropriate implementing measures to improve border security. In 2003 MAF released the Sea Container Review, which was an audit of the existing border measures for the importation of sea containers and it established the effectiveness of the inspections of sea containers. This report also highlighted potential improvements to the existing procedures and potential new technologies.

#### **1.4.2            Sea Container Review**

The Sea Container Review is a survey developed by a multi-disciplinary inter-agency team to assess the possibility of uncleared biosecurity risk goods passing through New Zealand's border and to identify any contaminants present. This involved quantitatively assessing the occurrence of risk material in containers and the ability to identify containers requiring inspection or goods clearance (based on manifest accuracy), as well

as assessing the effectiveness of current risk management techniques (such as cleaning certificates and on-wharf inspections) and the movement of containers around New Zealand. The survey focuses on the actual border pathway risks rather than the risks posed by individual commodities and pests that are associated with commodities.

The specific objectives of this survey were to:

- *“verify the accuracy of the manifested contents and packaging descriptions;*
- *find out the nature of sea container contaminants;*
- *ascertain the true internal contamination rate for both certified (with cleaning certificates) and uncertified sea containers entering New Zealand;*
- *determine the efficacy of the current on-wharf inspection methods for detecting risk material in or on imported sea containers;*
- *investigate the costs and benefits of using a portable probe camera to inspect containers on the wharf;*
- *ascertain the movements of sea containers in New Zealand;*
- *quantify the biosecurity risk posed by the sea container pathway, and the level of risk mitigation offered by current biosecurity clearance procedures” (Anon. 2003i)*

Auckland, Tauranga, Napier and Lyttelton ports were surveyed, which combined handled 83 % of the nation’s total containers for 2001/02, also ensuring a regional distribution of the results. A total of 11,265 containers were surveyed, 7,405 in Auckland, 1,824 in Tauranga, 3,723 in Napier and 1,663 in Lyttelton, with Full Container Load (FCL), Less than a Container Load (LCL) and empty containers inspected (Anon. 2003i).

The survey found that 14.6 % of the containers contained biosecurity risk cargo<sup>6</sup> at door inspection. Of the containers cleared at door inspection, 2.6% were found to contain biosecurity risk cargo at follow up inspections. Approximately 17% of all loaded containers surveyed contained biosecurity risk cargo. The highest occurring point of

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<sup>6</sup> Includes manifested and unmanifested risk cargo: with the majority cleared through normal cargo operations (Anon. 2003i).



origin of the contaminated cargo was from the Pacific Islands (73%) and the lowest from Asia and the Middle East combined (9%).

In this survey the most common risk goods<sup>7</sup> discovered were foodstuffs followed by used vehicles, machinery and other equipment, pet food, grain and timber. Although Australia was the largest source of food stuffs for the period 2001/02 (40% of total foodstuff imports), only 22% of Australian containers contained risk goods. The survey results showed that approximately 14% of the risk cargo in the surveyed containers did not comply with relevant import health standards (IHS) on arrival in New Zealand and was seized. With 35% of seized cargo being vehicles and machinery, 24% were cane-ware and used tyres, 12% were foodstuffs, and timber, wood and handicrafts accounting for 8%.

Of the 10,285 loaded containers that underwent door inspections during the survey, 4,294 were discovered to contain wood packaging material. Of the containers free of wood packaging material at door inspection, 102 containers were found to contain wood packaging material during follow up inspections. Approximately 48.7% of loaded containers were found to contain wood packaging material.

Of all the containers surveyed 4.5% were found to have some form of contaminants at door inspections, 20.7% of containers followed up were also found to have contaminants, therefore there was approximately 24.4% contamination rate of all containers. Soil was found to be the most common contaminant throughout the survey.

The survey found that approximately 7.4% of loaded containers contained goods which were not indicated on the manifest (excluding Freight of All Kinds (FAK) and 'general goods' cargo-type descriptions). Although unmanifested, the cargo was not seen to pose a biosecurity risk to New Zealand. Approximately 1.7% of containers were found to contain unmanifested biosecurity risk cargo.

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<sup>7</sup> “ Any organism, organic matter, substance or other thing that it is reasonable to suspect constitutes, harbours or contains an organism that may cause unwanted harm to natural or physical resources or human health in New Zealand; or that may interfere with the diagnosis, management, or treatment, in New Zealand, of pests or unwanted organisms” (Anon. 2003i).

During 2001/02, although outside of the survey, New Zealand Quarantine Officers at a transitional facility in Auckland unpacked 6,302 FAK containers, 7.9% of containers were found to have additional cargo not included on the manifest. Of all the unmanifested containers found in the survey, 66.7% were held for documentation or quarantine reasons (Anon. 2003i).

Of the containers inspected, 30.4% of the loaded containers contained packaging material that was inconsistent with that of the manifest description. However, many of the mis-manifested packaging materials were found to be non-risk. Unmanifested wood packaging material was found in 32.6% of loaded containers. Approximately 8.5% of loaded containers inspected (excluding FAK and 'general goods' containers) had unmanifested packaging material that required treatment or destruction.

During the survey approximately 14.8% of loaded containers and 6.5% of empty containers were on arrival were found to be contaminated with live or viable organisms. Many of these organisms already occur in New Zealand and are not regulated<sup>8</sup>, however, 6.1% of loaded and 1.6% of empty containers inspected were found to be contaminated with regulated organisms. For a detailed description of the types of live or viable organisms found refer to pages 24-25 and Appendix 1 of (Anon. 2003i).

Of the 10,302 containers surveyed 82% had packaging certificates being identified as correct. Although over 90% of all containers arrived in New Zealand with cleaning certificates, their internal contamination rate was not significantly different from the rate associated with the containers without certificates. The review highlights here that although cleaning cannot guarantee 100% contamination-free containers, the cleaning certificates could be the reason that 80% of the containers arrive free of internal contaminants.

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<sup>8</sup> "For the purpose of this review regulated includes all organisms not present in New Zealand (harmful or otherwise), except those for which entry approval has been granted by ERMA (regulated under the HSNO 1996); and organisms that would be subject to official biosecurity measures prior to importation, upon detection at the border or if found in New Zealand (regulated under the BSA 1993)" (Anon. 2003i)

Although the door inspection process is effective at detecting internal wood packaging (detecting 84.7% of internal wood packaging material) the process only detected 28.1% of fungi on wood, 20.5% of bark on wood, 21% of bark, 7% insect damage and only 5% of live insects on wood. The process also detected 72.2% of external soil contaminants, 10.6% of internal seeds, soils and plant materials, 4.2% of live insects, 4% of live spiders and only 5.9% of regulated/new fungi<sup>9</sup>

### **Recommendations**

The Sea Container Review proposed a series of potential risk mitigation measures to reduce the biosecurity risk associated with the importation of cargo via the sea container pathway. The review highlights that many of these proposed measures overlap or are linked and that some measures would need to be implemented in conjunction with others to be fully effective. The first five recommendations are summarised below, for the full list refer to pages 38-49 of (Anon. 2003i).

#### **a) Biosecurity Awareness Material**

This involves providing accurate up to date information on New Zealand's biosecurity requirements regarding sea containers in the appropriate languages to all areas of the industry, for example offshore exports, shipping companies, port companies and importers.

The review highlights that increased biosecurity awareness has the following advantages:

- *“will lead to greater compliance and reduce costs;*
- *Reduction in biosecurity risks;*
- *Such programmes could be expected to show a quick return, as very little material is currently available;*
- *can leverage off work already done by the Protect New Zealand programme; and*
- *can be linked into the biosecurity requirements of other countries”.*

And the disadvantages with this measure include the following:

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<sup>9</sup> (Anon. 2003i) page 28

- *“the cost of preparing the material; and*
- *on-going funding may not be available”<sup>10</sup>.*

### **b) Offshore Certification**

The review proposes that the current certificate process could be widened to also cover the exterior of sea containers. Certification will continue to be the responsibility of the shipper; with uncertificated containers being regarded as high risk and inspected on arrival.

The review suggests that offshore certificates have the following advantages:

- *“risk mitigation carried out offshore;*
- *shared responsibility;*
- *facilitated entry of the container;*
- *some cost borne by the exporter; and*
- *in some circumstances, certification may provide equivalence for some arrival processes and further facilitate delivery”.*

And the seen disadvantages are as follows:

- *“cost of awareness and auditing programmes; and*
- *difficult to monitor processes to ensure compliance”.<sup>11</sup>*

### **c) International Harmonisation of Biosecurity Standards for Containers**

The review suggests that New Zealand together with the international trading community continue to promote harmonisation of biosecurity standards for containers and containerised cargo. Along with the possibility of further developing information management, biosecurity awareness and certification, the review suggests the creation of international container risk profiles, and that the international community undertakes investigations into new and innovative technology to improve effectiveness and cost efficiency.

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<sup>10</sup> (Anon. 2003i) page 38

<sup>11</sup> (Anon. 2003i) page 39

The review suggests that these processes could have the following advantages:

- *“enhanced awareness of the biosecurity risk and requirements for sea containers;*
- *a standard “look and feel” to container biosecurity documentation and requirements, which would result in greater recognition and compliance;*
- *will lead to greater compliance and reduction in global biosecurity costs;*
- *risk profiles can be built into more quickly and targeted more finely by incorporating data from larger countries; and*
- *can be built on existing international relationships and structures’.*

And the disadvantages are as follows:

- *“difficult and time-consuming to get international agreement on standards; and*
- *New Zealand may require higher standards of compliance than international agreements can deliver.”<sup>12</sup>*

#### **d) Intelligence-based Electronic Risk Profiling System**

A electronic risk profiling system, targeted at high risk containers, with links to appropriate governmental agencies and industry was also one of the recommendations in the Auditor-General’s Management of Biosecurity Risk Report 2002: Case Study 6 (Anon. 2002f).

The review highlights a series of 12 advantages that electronic risk profiling could offer, the top five are as follows:

- *“increased efficiency and effectiveness by targeting high-risk containers, cargo, origins, shippers and importers;*
- *faster processing for MAF, shipping companies, port companies and consignees;*
- *could form part of a whole government import goods management system or a joint Australian biosecurity and customs system;*
- *allows large amounts of data to be captured and analysed, and can therefore be used as an ongoing profiling tool for identifying higher-risk containers; and*
- *information on the biosecurity status of specific containers could be made available online to all affected parties”.<sup>13</sup>*

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<sup>12</sup> (Anon. 2003i) page 40

### **e) External Visual Inspection**

With this measure the review proposes the inspection of the external surfaces of containers for contaminants. This could occur at several stages along the container logistics pathway. A requirement for a six-sided external examination could be incorporated into the existing process which already requires external examination for the structural integrity of the container before packaging and shipping. Again, these six-sided external examinations for contaminants on the wharf are an ideal option for high-risk containers.

## **1.5 Thesis Objectives**

A review of the factors influencing the integrity of New Zealand's biosecurity management process has identified three main areas of weakness: current inter-departmental harmonisation and funding responsibility, funding of biosecurity and border inspection under development (Budd 2000). As biosecurity risk for all trading nations is of increasing concern, research and development of information and technology regarding the possible reduction of potential risks is a growing area (Anon. 2003i).

The biosecurity risk associated with some pathways into New Zealand, such as passengers and their luggage, can be managed through undertaking 100 % inspection. Prior to the implementation of the six-sided full sea container inspection regulation in 2001, MAF inspected an estimated random quarter of all incoming and outgoing sea containers (Anon. 2002f, d, 2003a). Since 2001, 100% of all sea containers entering New Zealand undergo six-sided full inspection. It is widely acknowledged that no one method could adequately reduce all the risks associated with the importation and exportation of commodities using sea containers (Anon. 2003i).

The Sea Container Review (Anon. 2003i) recommends an integrated system involving numerous steps which are flexible enough to cope with all the variation in containers, commodities, importers, exporters, points of origin and chain of custody. With the

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<sup>13</sup> (Anon. 2002d) page 41

reports major recommendation being the development of an intelligence-based risk assessment system which will be used with other measures such as supervision of unpacking and the facility audit results. This system is recommended to be a government owned system to be used across all associated agencies creating a national information data base, with the possibility of combining the needs for New Zealand and Australia.

The objective of this research is to identify information and technology gaps as well as overlaps and to identify and develop possible solutions that could provide New Zealand with a more cost effective and efficient biosecurity information management system for three sea importation pathways. This research will focus on the pre-border and border aspects of the sea container pathway and the biosecurity management systems in place in accordance with the recommendations set out by MAF (Anon. 2003i) and the OAG (Anon. 2002f), more specifically it addresses the following key tasks:

- Assess the linkages between international agreements and domestic legalisation and how they influence operational methods utilised in New Zealand;
- Determine what biosecurity risks are and how risks are managed at the border level:
  - Transitional Facilities,
  - Airports and,
  - Sea ports;
- Determine a relationship between the number of sea containers and used vehicles, and the number of potential contaminants entering New Zealand;
- Assess which aspect of the biosecurity management of sea containers and used vehicles has the most influence on the biosecurity risk New Zealand faces; and
- Assess the potential costs of improving current biosecurity management systems

The scope of the research was decided on the basis that pre-border and border controls have been identified as the most essential elements of any biosecurity management system and the focus of recommendations of various government agencies. Therefore, while it is acknowledged that incursion and pest management are an integral aspect to protecting New Zealand's environmental, economic and public health, this research does

not include incursion and established pest species management and their associated costs, nor does it included the responsible agencies' response time to the discovery of a new incursion.



## **1.6 Thesis outline**

### **Chapter 1: Introduction**

Literature review of history of sea transportation and New Zealand's border management and outlines this study's research objectives.

### **Chapter 2: Biosecurity**

This chapter defines biosecurity and biosecurity risk, and outlines the development of biosecurity in New Zealand.

### **Chapter 3: New Zealand's Major Trading Partners**

Overview of New Zealand's major trading partners and identification of New Zealand's top three trading partners

### **Chapter 4: International Trade Agreements and Administrative Bodies**

Summarisation of the international trade agreements New Zealand is signature to.

### **Chapter 5: Domestic Legislation and Administrative Bodies.**

An overview of New Zealand's national legislation relevant to biosecurity, border management and of the administrative bodies responsible for managing New Zealand's biosecurity.

### **Chapter 6: New Zealand's Borders and Biosecurity Management**

Definition of borders and how they are crossed and a distribution of New Zealand's points of entry and transitional facilities as well as an outline of import health standards for the importation of sea containers and the Biosecurity (costs) Regulations 2005 are also outlined.

### **Chapter 7: Slippage along Three Importation Pathways.**

Presentation of a series of models that estimate the slippage along the sea container, woodpackaging and used vehicle pathways into New Zealand and sensitivity analysis of the slippage rate under different border management procedures.

**Chapter 8: Estimating the Cost of Future Slippage.**

Example costs estimates for importers for inspecting each unit imported along the three pathways (sea containers, woodpackaging and used vehicles) utilising the models developed in Chapter 7.

**Chapter 9: Discussion**

Discussion of the outcomes of this research.

**Chapter 10: Conclusion and Management Implications.**

Summary of the findings of this study and discussion of their management implications for border management.

# Chapter 2

## Biosecurity

*“How we “see” biosecurity as a nation has fundamental influences on how we evolve systems to protect our ecology and economy.” (Anon. 2000)*

### 2.1 Introduction

When discussing the management involved in protecting New Zealand’s environmental, public and economic health, it is important to use consistent terminology. Until recently, the term Biosecurity was loosely used within New Zealand governmental departments to describe managing New Zealand’s border to prevent the introduction of regulated and unwanted species and organisms. The aim of this chapter is to set out clear definitions for biosecurity and outline the development of biosecurity within New Zealand. The first is achieved through highlighting the difference between security and biosecurity as well as through describing what constitutes a risk to security and biosecurity. The process through which biosecurity is developed within New Zealand has been described through summarising the major audits of New Zealand’s recent biosecurity history.

### 2.2 What is Security?

Although the concept of security is an old one, its definition and focus have changed to meet the demands of globalisation. In an attempt to define “security” in terms of international relations, (Huysmans 1998) highlights that in principle there is no limit to the definitions of security. However, he also concludes that human actions are primarily driven by a fear of death objectified as a fear of those who have the capacity to inflict death upon others “... *the fact that is decisive for his (i.e. man’s) social and political attitudes and ideas is that other human beings are able to inflict death upon him*” (Huysmans 1998). When defining “security” (Huysmans 1998) also points out that there are two major schools of thought; the reasoning that security is about the

pursuit of freedom from threat, and that external actions negatively affect a nation's national security by degrading the nation's most important values.

The terrorist attacks in the USA (September 2001) and in Bali in 2002 have lead to the world becoming more aware of risks to domestic or national assets (Anon. 2003g) (Meyerson and Reaser 2002). In a recent report to the New Zealand Controller and Auditor-General, domestic security was defined as “... *preventing or defending against threats that are conventional in approach (i.e. not by traditional military means) and are directed towards the interior of a state rather than its external forces.*”<sup>14</sup> This definition is consistent with the American definition of ‘Homeland Security’- “... *is a concerted national effort to prevent terrorist attacks within the United States, reduces America's vulnerability to terrorism, and minimize the damage and recover from attacks that do occur*” (Anon. 2002h).

Threats to domestic or national security arise from a wide spectrum of criminal actions from external and in some cases internal sources. However, domestic security can also be affected by international and national events that are not necessarily criminal. These include outbreaks of infectious diseases, which have the potential to negatively impact a nation's economic, social and environmental health, such as Foot and Mouth Disease, SARS (Anon. 2003g) and the Avian Flu<sup>15</sup>. During the 1980s and 1990s debates regarding the definition of security began to consider whether or not the meaning of security should be widened from a mostly military focus to include different sectors and referent objects, i.e. adding economic, societal, political and environmental risks (different sectors) to the traditional military agenda and expanding it by adding individual, ecological system and community to the usually state centred agenda (referent objects) (Huysmans 1998).

Traditionally, in New Zealand domestic security has focused on the monitoring of movements of people and goods at ports of entry. However, given the recent events and changes in the international trading environment, New Zealand has begun to increase the efforts preventing unwanted goods and people from even departing for

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<sup>14</sup> (Anon. 2003g) page 15

<sup>15</sup> <http://www.cdc.gov/flu/avian/> 24-03-06

New Zealand. Internationally, efforts have also concentrated more on all stages of the movement of goods and people, from their point of origin to their final destination with the aim of increasing security and to facilitate the trade and movement of legitimate commodities and people (Anon. 2003g).

### 2.3 What is Biosecurity?

In relation to security, the term biosecurity generally refers to the aspects of national security that have the potential to adversely affect a nation's biological health (in terms of economic and environmental health) through the importation of goods, persons and craft. The term 'biosecurity' has a variety of meanings in common usage and at time differing emphases (Meyerson and Reaser 2002, Waaga 2007). In addition, different words in common usage such as bio-safety and biological security have been used in the same context as biosecurity<sup>16</sup>. These inconsistencies have lead to confusion within the literature and also in national and international trade and customs legislation (Cooney and Lang 2007). For example, in contrast to New Zealand, in the USA the term biosecurity is the sum of risk management and defence against biological threats, however, the emphasis is on countering bioterrorism, i.e. biological threats or biological agents that have potential to cause harm from individuals or groups that are politically, religiously or ideologically motivated (Anon. 2001a, Meyerson and Reaser 2002). While, similar to New Zealand, in Australia biosecurity is defined as the prevention of the entry, establishment or spread of unwanted pests and infectious disease agents in people, animals, plants or the environment (Anon. 2003f).

In New Zealand, biosecurity, as defined by the Biosecurity Strategy Development Team, "*...is the protection of New Zealand's economy, environment and people's health from the risks posed by pests and diseases*" (Anon. 2001c). This definition takes into account the prevention of new pests and diseases from arriving, and the control and eradication of pests and disease pre-existing within New Zealand (Anon. 2002a). It has often been said that New Zealand has a world leading biosecurity system, (Anon. 2002g) (Anon. 2003j) (Anon. 2003a), which involves strict controls

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<sup>16</sup> <http://en.wikipedia.org/wiki/Biosecurity> 13 December 2006

on all aspects of the management of New Zealand's biosecurity, for example, pre-border and border controls, surveillance and pest management.

During the past ten years, New Zealand has managed its biosecurity risks with great emphasis on protecting New Zealand's agricultural sectors from exotic pests and diseases (Anon. 2000) with relatively high success (Anon. 2001c). Increasing volumes of international trade and travel mean that all countries, including New Zealand, are required to be more vigilant in protecting against the spread of pests and diseases that threaten the health of people, animals, plants and the environment in key areas such as airports, seaports and transitional facilities (or satellite ports) (Lambie 2002). Accordingly, the emphasis of biosecurity within New Zealand has moved to include human health as well as protecting native and valued introduced flora and fauna, and indigenous terrestrial and aquatic environments (Anon. 2003j). The most significant shift was the passing of the Biosecurity Act 1993 (BSA 1993) by the New Zealand Parliament. The BSA 1993 takes into account the nature and effect of introduced organisms on people, plants and animals and the New Zealand economy; which are also continued through the launch of the New Zealand government's Biosecurity Strategy in 2003.

Public awareness of biosecurity issues within New Zealand has recently increased, with both public and industrial sectors having expressed concern that the biosecurity management systems currently in place are not as efficient and targeted as required, given the increase in international trade and travel (Anon. 2001c). These concerns are illustrated by recent incursions including the painted apple moth (PAM) (*Teia anartoide*) (Anon. 2002d), the red imported fire ant (*Solenopsis invicta*) (Anon. 2002e) and the southern saltmarsh mosquito (*Ochlerotatus camptorhynchus*) (Anon. 2002c).

## **2.4 Biosecurity Risk**

The term risk refers to the potential negative impact on something of value; with the common usage of risk referring to the probability of a loss or threat to anything of

value<sup>17</sup>. The perceptions of risks differ amongst the population, depending on education culture and attitude towards their surroundings. Perceived environmental risks include ecological impact, human benefits, knowledge and controllability of impacts (McFarlane 2005).

In terms of biosecurity, a risk constitutes an organism that has the potential to negatively impact on a nation's environmental, economic and public health (Anon. 2003j). There are many forms of biosecurity risks that can enter any country (Anon. 2003j); the species that are considered a biosecurity risk are non-native species that have the potential to be invasive species (Anon. 2001d, Sumner 2003).

Although there are non-native species that have been intentionally introduced with beneficial outcomes, (such as species that form food corps and live stock as well as those that are used for landscape restoration and biological control), non-native species that have the potential to have detrimental effects on natural and productive environments and public health are considered to be non-native invasive species (Vitousek *et al.* 1997, Pimentel *et al.* 2000, Sumner 2003, Pimentel *et al.* 2005, Simberhoff *et al.* 2005). Introductions of non-native invasive species have had and can have severe environmental and economic impacts on a nation (Pimentel *et al.* 2000, Pimentel *et al.* 2005). Such impacts include native species extinction, alteration or loss of natural ecosystems (Vitousek *et al.* 1997), loss of production in the agriculture (Ross 2004), forestry (Zahid 2008, Vizzini 2009) and fisheries (Wonham 2001), and large economic costs for pest species management (Pimentel *et al.* 2000, Pimentel *et al.* 2005) and public health (Eritja 2005).

Facilitated by the rapid expansion of global trade, transport, and travel, invasive species and their effects are increasing at an unanticipated rate (Anon. 2001d, Sikder *et al.* 2006). Invasive species enter a country by means known as pathways; this includes intentional and unintentional importations. Unintentionally introduced invasive species can be transported in or on commodities such as produce (Anon. 2002b), nursery stock (Reichard and White 2001) and livestock (Anon. 2003i) or in the transport equipment such as packaging materials (Haack 2006, Haack and Petrice

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<sup>17</sup> <http://en.wikipedia.org/wiki/Risk> 13 December 2006

2009) or ship's ballasts water (Bulman 1998, Gadgil and Bulman 2002, Anon. 2003j, Hewitt *et al.* 2004).

Given that the nature of the numerous pathways is diverse and constantly changing (Anon. 2003i), prevention (though preferred is very complex and not always achievable) is dependent on the capabilities of other trading nations' effective management of invasive species and their possible pathways (Anon. 2001d). Invasive species, once established, pose a threat to the region, the region's trading partners and to any other country along the trade route (Floerl and Inglis 2005). A major aspect of prevention is identifying possible pathways and assessing their risk levels according to their potential impacts and then developing the management procedures to reduce possible risks (Floerl and Inglis 2005, Sikder *et al.* 2006,).

Risk assessment is used as a means to reduce the potential biosecurity risks associated with the movement of international trade through evaluating the risks connected with specific commodities as well as the origins of the commodities and vessel (Floerl and Inglis 2005). As a member of the WTO (see Chapter 4) New Zealand has to justify any restrictions or biosecurity measures through science based risk analyses (Anon. 2002f). The development of IHS has enabled MAF to target high-risk pathways and commodities and set procedures designed to lessen the associated risks. For example, 65% of invasive ants are linked to sea containers that originate from the Pacific Islands. Therefore all containers from that region are considered high risk, and consequently these containers (along with all containers from other high risk regions) are inspected fully, both externally and internally, by a MAF inspector upon arrival in New Zealand (Nendick and Sarty 2006).

## **2.5 The development of biosecurity within New Zealand**

Throughout the early settlement of New Zealand many exotic species were introduced to contribute to the pleasure and profit of New Zealand's settlers; this is reflected by the legislation of the time. Early legislation was passed to promote the establishment of introduced species, including the Protection of Certain Animals Act 1861, banning the hunting of introduced animals until 1870. In 1866 the Act was amended for the hunting on private land. This was followed by the Animal Protection Act 1867 which



also aimed to encourage the importation of exotic species. This Act was amended 21 times until it was succeeded by the Animals Protection and Game Act 1921. Under the Animals Protection Act amended of 1907, open hunting season remained at one month per year (Thomson 1922).

However, the protection of introduced species was removed in 1923, and by 1930 government culling of deer had begun and possums were officially declared a pest species. The Wildlife Act 1953 was the first Act for the protection of indigenous wildlife, the regulating of game shooting and the control of wild exotic pest animals. By 1956 all deer, thar, chamois, wild goats, feral pigs and possums were declared pests under the Noxious Animals Act 1956. This Act was followed by the Agricultural Pest Destruction Act 1967 and then the Wild Animal Control Act 1977; both were established to make better provisions for the control of introduced harmful wild species and to provide the means of regulating recreational and commercial hunters.

Although biosecurity as a national concept did not exist until the 1990s, legislation protecting New Zealand's biological health from unwanted organisms and pests, began to be developed earlier. For example protecting New Zealand's forests began with the Forests Act (1949), which came into force on the 1<sup>st</sup> January 1950. It enabled the then Ministry of Forestry to protect New Zealand's forest resources from any forest products (whether imported or exported) that may pose any threat to the industry. Section Part IV: Miscellaneous Provisions s. 69-72 of the Forestry Act 1949 also provided the Ministry with regulations with which to control or manage existing tree diseases. Although the legislation that followed the Forests Act 1949 did not specifically refer to any biosecurity obligations, it indirectly enabled Ministries to protect New Zealand's environment. This legislation includes the Conservation Act 1987, which was created with the purpose of promoting the conservation of New Zealand's natural and historic resources as well as establishing the Department of Conservation under Section five of the Act. The Public Finance Act 1989 enables the government to obtain the necessary funds for biosecurity activities. The Forests Produce Import and Export Regulations 1989 were passed as a consequence of and succeeded Section 69 of the Forest Act 1949. These regulations set out the

requirements to be met by importers and exporters of any forest products and provide the legal basis of inspecting imported forest products for insect pests and diseases.

Biosecurity as a national concept began in 1990 with the introduction of the Biosecurity Act (BSA 1993) in 1993 (See Chapter 5). The BSA 1993 was vital in the reformation of the laws regarding wild animal management pre-existing within New Zealand and the protection of New Zealand's natural and agricultural resources. The purpose of the Biosecurity Act is as follows: "*An act to restate and reform the law relating to the exclusion, eradication, and effective management of pests and unwanted organisms.*" The BSA 1993 works in conjunction with 43 other public Acts as well as private Acts (Appendix III) to cover all the different aspects of biosecurity.

There are currently five government agencies that are involved in the management of New Zealand's biosecurity:

- Ministry of Agricultural and Forestry (MAF),
- Ministry of Fisheries (MOF),
- Ministry of Health (MOH),
- Environmental Risk Management Authority (ERMA),
- Department of Conservation (DOC).

Each agency is directly responsible for managing the biosecurity risk within their respective sectors under the BSA 1993. The Memorandum of Understanding between MAF, DOC, MOF and MOH was written to provide an overarching framework for the agencies to work efficiently together on biosecurity matters<sup>18</sup>. The government's biosecurity program is coordinated by MAF, in agreement with the other four agencies and controls overall terrestrial and freshwater biosecurity (Anon. 2006d).

In 1999, the Biosecurity Authority was established by MAF "*...to protect New Zealand's unique biota by managing biosecurity risks.*" This was to include the development of effective risk management programs such as science based import health and border protection standards and the continual surveillance of New Zealand's animal, plant and forest health. MAF Biosecurity Authority was

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<sup>18</sup> <http://www.biosecurity.govt.nz/bio-strategy/papers/biosecurity-mou.htm> 24-03-06

responsible for exotic pest and disease control, including a supportive role in the development of pest management strategies and a rapid response capability to invasions from exotic organisms. As part of MAF the Biosecurity Authority was responsible for leading and coordinating the governments' biosecurity programs in partnership with other agencies. However, MAF underwent major restructuring at the end of 2004, and the then Biosecurity Authority was replaced with MAF Biosecurity New Zealand in November 2004. Despite the restructuring, the roles and functions of this division have essentially remained the same.

Throughout its development process New Zealand's biosecurity system has been under regular review. This included a review of the Management of Biosecurity Risk by the Auditor General's office in 2002, the development of the National Biosecurity strategy in 2003, The Sea Container Review, (Chapter 1) and a review of MAF Biosecurity New Zealand's border management in: "Managing biosecurity risks associated with high-risk sea containers", report by the Auditor General's office in 2006.

## **2.6 Recent Reports on New Zealand's Biosecurity System**

### **2.6.1 Ministry of Agriculture and Forestry: Management of Biosecurity Risks. Report of the Controller and Auditor General 2002**

The purpose of this audit was to examine and provide information to Parliament and the public on how MAF manages New Zealand's biosecurity risks. The audit was carried out through the examination of the biosecurity risk management system's structure, policies and procedures<sup>19</sup>. However, it did not examine the effectiveness of MAF Quarantine service, marine biosecurity (responsibility of the Ministry of Fisheries) and the roles of regional councils, nor did it review biosecurity related legislation<sup>20</sup>. The results of this audit are reported in six parts and seven case studies. The report's findings and recommendations are summarised below.

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<sup>19</sup> (Anon. 2002g)page 23

<sup>20</sup> (Anon. 2002g) page 27

The report highlights that experts in New Zealand and from other countries have consistently expressed that New Zealand's biosecurity arrangements are amongst the best in the world, referring to the overall professionalism, fairness, and the consistency and transparency of New Zealand's approach. This is shown by other nations adopting measures that New Zealand has implemented. For example, Biosecurity Australia adopted aspects of MAF's risk analysis into their own processes following New Zealand's approach to the importation of table grapes from California<sup>21</sup>.

The report also recognises that biosecurity is multifaceted and that effective risk management requires all relevant government officials to work closely and effectively together. Although the three main agencies involved (MAF, MOH and DOC) have an established relationship, the report suggests that there is a need to improve communications between them by acting on the following:

- *“clear roles and responsibilities;*
- *clear accountability for the biosecurity program;*
- *agreement on a common outcome; and*
- *an agreed common framework for assessing risks and priorities”<sup>22</sup>.*

The report further recognises that the deficiency in common goals and outcomes for New Zealand's biosecurity system have lead to a lack of accountability and difficulty for departments to reach agreement from their different perspectives. All theses inadequacies have given rise to the development of an *ad hoc* system, with little systematic cost-benefit analysis. One example is the rapid implementation of additional border controls measures in response to the potential increased risk of foot and mouth disease following the international out-break in 2002, which has lead to a large, unexpected increase in expenditure<sup>23</sup>.

The report acknowledges that the allocation of funds and resources is a complex matter with many sectors requiring large additional funds to respond to recent threats,

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<sup>21</sup> (Anon. 2002g) page 31

<sup>22</sup> (Anon. 2002g) page 32

<sup>23</sup> (Anon. 2002g) page 34

for example for the response to the detection of the southern saltmarsh mosquito and new airport security equipment (such as X-ray machines and dogs). The report recommends that all biosecurity risks should be assessed on the same basis, thus removing the likelihood of bids for funding being assessed applying different methods.

It is further acknowledged that the general public and the industry sector play a major role in biosecurity measures. Public and industry awareness strengthens New Zealand's biosecurity by increasing compliance with quarantine requirements and raise the chance of detecting new pest and diseases early. For example members of the public alerted officials to the presence of pests such as the southern saltmarsh mosquito, the painted apple moth and the red imported fire ants<sup>24</sup>.

The report also recognises that although MAF in part has to rely on overseas agencies to ensure that goods exported to New Zealand meet the relevant biosecurity requirements set out in the IHS, total compliance with these measures in work undertaken overseas can not be guaranteed. Thus pre-border and border measures and successful international relationships help encourage cooperation and compliance<sup>25</sup>.

The report highlights that at the time of the audit, the three main operational groups (animal, plant and forest) that make up MAF Biosecurity were working independently of each other, thus unable to effectively use their collective knowledge and skills. The audit found that the three main groups inconsistently managed incursion responses, leading to varying rates of success<sup>26</sup>. The report acknowledges that MAF has recognised these discrepancies and has begun addressing the issues.

The report's findings also highlight that the biosecurity system is over extended, finding several examples of high workload pressures in MAF Biosecurity and other agencies, at times leading to re-prioritisation of important work.

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<sup>24</sup> (Anon. 2002g) page 36

<sup>25</sup> (Anon. 2002g) page 37

<sup>26</sup> (Anon. 2002g) page 38

## **Recommendations**

### **The Whole Government**

The report by Auditor General's office, MAF: Management of Biosecurity Risks, recommends improving the co-ordination between the four main departments by reviewing and updating the Memoranda of Understanding<sup>27</sup>; this should include documenting how and what decisions are reached. Recommendations are made to establish ground between the departments to ensure a consistent approach and setting of specific goals and outcomes clearly defined by the Biosecurity Strategy (see section 2.6.2 below). To strengthen accountability the report suggests that the roles, membership and mandate of the Biosecurity Council should be reviewed, a task recommended to be undertaken by the Council's Technical Forum. The report recommends further that the Director-Generals and Chief Executives of the relevant government departments meet regularly and report to the minister and as a group they should also be responsible for strategic planning.

Since its establishment in 1999 the Biosecurity Authority produced a series of reports including the Biosecurity Strategy. The strategies development began in 1999 and underwent a series of drafts until its publication in August 2003.

#### **2.6.2 Biosecurity Strategy 2003**

In August 2003 the Biosecurity Council released the strategy "Protect New Zealand: The Biosecurity Strategy for New Zealand". This strategy has a wide scope providing recommendations and goals for the New Zealand government in all areas of New Zealand's biosecurity. The strategy document is divided into four parts, and a summary of each part is given below.

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<sup>27</sup> <http://www.biosecurity.govt.nz/bio-strategy/papers/biosecurity-mou.htm> 27-03-2007

## **Part 1**

### **Goals**

The strategy outlines goals for the management of New Zealand's Biosecurity in 2010. These are as follows:

- *“Protecting marine and terrestrial primary industries and facilitating exports and tourism;*
- *Protecting New Zealand's indigenous biodiversity – our native species, natural habitats, ecosystems and landscapes;*
- *Enabling sustainable use of natural resources and protection of natural environment;*
- *Maintaining the relationships between Maori and their culture and traditions with ancestral lands, waters, sites, waahi tapu and taonga;*
- *Protecting the health of New Zealanders from zoonotic and pest-borne diseases and from venomous species; and*
- *Reducing the damage caused by pest and diseases introduced in the past”.*<sup>28</sup>

### **Boundaries**

Although the strategy has a relatively wide scope covering a number of issues, it is constrained by the following boundaries:

The strategy paper does not address the framework for the management of intentional introductions of new organisms into New Zealand, a subject covered under the HASNO Act 1996, nor does it focus on the role and capability of ERMA. Biological terrorism is also an area not encompassed by the strategy<sup>29</sup>.

## **Part 2.**

### **MAF as lead agency:**

The Biosecurity Strategy highlights the need to have a central government agency to take total responsibility for all areas of New Zealand's Biosecurity. The strategy

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<sup>28</sup> (Anon. 2003j) page 8

<sup>29</sup> (Anon. 2003j) page 7

recognises that MAF is the logical department to become this agency. With this responsibility the Biosecurity council would expect MAF to develop systems and the capability for protecting all aspects of New Zealand's biosecurity. Changes would be necessary, largely to define responsibilities more explicitly and to make decision making more transparent. Improvements in the connections between government agencies and between aquatic, environmental and health sectors, both public and private, are also highly recommended by the authors, encouraging the delegation of tasks to other government departments, where there is specific knowledge; however, the overall responsibility will remain with the Director-General of MAF<sup>30</sup>.

### **Gaps in the system**

The current system is fragmented across several agencies, which makes identifying gaps within the system difficult. The strategy paper highlights the lack of attempt or incentive of all agencies involved in assessing the gaps across New Zealand's entire biosecurity system. As it stands, the current system operates in isolated pockets addressing individual sector interests with no total overview. The report concludes that the current system is not strategic, which allows for the escalation in overall costs. The consequences of such a system can be seen by the incursion of the Painted Apple Moth and its management<sup>31</sup>. Another point highlighted in the strategy is the existence of different stages of development in the various sectors, which coincides with some sectors having critical gaps in baseline knowledge or lacking in capabilities such as diagnostic tools and treatment tools<sup>32</sup>.

Overall the strategy paper identifies a total of 80 gaps in the processes of the current system during the development of the strategy and associated cabinet papers. The gaps are found across all areas of the current system in varying degrees of severity. The strategy gives nine examples of gaps, the first of which could be deemed the most important. Some are listed below:

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<sup>30</sup> (Anon. 2003j) pages 17 & 18

<sup>31</sup> (Anon. 2002d)

<sup>32</sup> (Anon. 2003j) page 23



- *“Important biosecurity data is stored in a range of information systems run by different groups. This results in gaps and duplication, inconsistency and poor accessibility of information. A coordinated information strategy is needed to ensure this information is shared.*
- *A more proactive approach is needed in assessing emerging threats, to enable identification of potential pests and pathways and implementation of measures to prevent their entry, spread and establishment.*
- *There are significant knowledge gaps in risk analysis, for example the likelihood of different products (commodities) carrying pests and viruses and their response to various treatments. Such gaps can only be addressed by research that, since the agents are always exotic, could be carried out in the research institutes abroad or under suitable containment provisions in this country.”*<sup>33</sup>

The strategy paper recommends a standardisation of all processes and attributes the lack of consistency within the system and related activities to the haphazard nature of the systems overall development. It also acknowledges that the system’s fragmentation reflects its underpinning knowledge and decision systems. Critical information for the decision making process is not communicated between government agencies, or the information is incomplete, and people who require access to systems do not have it. Processes for assessing external impacts and evaluating their consequences are either missing, rudimentary, or operating in isolation.

### **Science**

The strategy paper highlights that science is critical to the foundation of biosecurity as a whole and identified the following key issues:

- *“Connections: the need to integrate science into biosecurity policy and decision making, not just in the implementations of incursion response;*
- *Capability: the need to protect and develop science capability across the spectrum, from pre-border through to pest management;*

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<sup>33</sup> (Anon. 2002d)

- *Balance of Investment: the need to move more investment into pre-border (i.e. prevention) and to develop 'whole-of-government' priorities for spending".<sup>34</sup>*

The strategy recommends:

- *"A guideline for biosecurity research needs to be developed to create overall agreed long-term research priorities to guide the Foundation for Research, Science and Technology (FRST) and the agencies;*
- *Scientists should be more actively involved in decision making, not just brought in to help with incursion responses. This ad-hoc and reactive use of science needs to be reviewed, as it risks poorer decisions and reduced science capability.*
- *There needs to be an assessment of the benefits of pre-border interventions and related research, and combined with the prioritisation work to ascertain whether a case can be made for more research funding.*
- *Greater emphasis is needed on developing long-term partnerships with scientists and with government agencies to build capability and knowledge, all with appropriate cost control.*
- *An open information exchange between all parties involved is needed. Scientific information for biosecurity management is a public good and a critical component in decision-making, yet access to it varies across the spectrum."*

### **Priorities and Funding**

The strategy addresses the need for an increase in funding over the coming years based on justified priorities and the support from all biosecurity agencies. The strategy also expresses concerns that current allocation of funds and resources may not be optimal. A majority of the funding is allocated to known risks and activities in preference to acknowledged risks, of which there is very little known. The strategy paper also outlines the funding for New Zealand's biosecurity system. The

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<sup>34</sup> (Anon. 2002d) page 26

government has overall responsibility for funding and taxpayers are not entirely liable, while about 20% is recovered from third parties<sup>35</sup>.

### **Part 3**

The strategy paper also repeatedly states that effective biosecurity systems rely on constantly updated information on pests, pathways and capabilities to manage any potential and existing risks.

### **Risks**

Risks are considered to be any exotic species that could threaten to harm any of New Zealand's native species, environments and public health. These potential pests or risks range from microbes to plants and animals in both aquatic and terrestrial environments. Although New Zealand has a few native pest species, the majority of species that are considered to be pest originate from other countries<sup>36</sup>.

### **Pathways**

Intentional introductions were prevalent throughout the early European settlement of New Zealand. However, even though currently there are strict controls in place limiting legitimate introductions to lower the potential threat to New Zealand, the greatest risks are associated with accidental introductions, the smuggling of organisms and contaminated goods<sup>37</sup>.

Over the past five years there has been an approximately 50% increase in the number of containers entering New Zealand from an increasing number of points of origin, each with varying priorities and interest in maintaining international biosecurity. To coincide with these increases, the strategy paper presents examples of potential threats to New Zealand's biosecurity associated with trade utilising sea containers, as follows:

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<sup>35</sup> (Anon. 2002d) page 31

<sup>36</sup> (Anon. 2002d) page 34

<sup>37</sup> (Anon. 2002d) page 34

- *Packaging material harbouring wood-boring insects could impact on our forest and cause significant damage to wooden buildings.*
- *Pooled water harbouring mosquito larvae could carry serious human diseases.*
- *Increasingly containers contaminated with seeds, plants material, insects, spiders and even snakes are landed in NZ.<sup>38</sup>*

In addition to these threats, the products in the containers may also be risk goods such as fruit or meat, which can be hosts for a range of pests. As it is impractical to check all containers at the wharf upon arrival; many containers are transported inland for kilometres before being unloaded without supervision. Many containers are judged low risk based on cargo manifest and their points of origin. With regard to New Zealand's own biosecurity priorities, New Zealand, like many other trading nations, has obligations to meet international commitments under multilateral environmental agreements, such as the Convention on Biological Diversity and the U.N Convention on the law of the Sea, which include specific provisions for the protection, eradication or management of pest species.

There are other pathways by which potential threats may enter New Zealand, such as air-cargo, ballast water, tourists and their effects and mail. Under several international trade agreements countries are expected to prevent the spreading pests. New Zealand is also working towards the adoption of international controls on ballast water to reduce the risk of transferring marine species between countries.

The strategy paper emphasises that pre-border measures are strengthened through Importation Health Standards (IHS). These standards were established to reduce the risk of harmful species and substances entering New Zealand in traded goods. IHS require the implementation of commodity-specific protocols of commodities and packaging prior to shipment. These include heat treatment of imported foods, disease testing of animals and inspection of used vehicles.

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<sup>38</sup> (Anon. 2002d)page 35

IHS have traditionally focused on the terrestrial and primary production and not on environmental pests, the strategy underlines the need for new approaches to address the gaps through newer, more balanced IHS<sup>39</sup>. The strategy also acknowledges that the current system is under stress, as many of the earlier standards need to be reviewed and updated.

It is further acknowledged that New Zealand's marine border controls have been unable to meet the increase in risk and have thus attributed the failure to:

- A lack of capacity which has forced a triage approach, i.e. systems are only treated if an impact is highly likely;
- A lack of explicit inter-agency arrangements for comprehensive border management; and
- A significant lack of management tools for key pathways.

### **Surveillance**

As the strategy acknowledges that incursions are inevitable<sup>40</sup>, there must be a wide range of surveillance activities directed at both the detection of species and monitoring of the health and pest status of plants, animals and ecosystems. A review of the biosecurity surveillance systems in 2002 highlighted among others the following six main issues:

- *“Some programmes appeared to be working well; for example, fruit fly and mosquitoes at ports;*
- *There has been a major progress in establishing a rational approach to marine surveillance programmes;*
- *Many surveillance activities had very little technical support;*
- *There were gaps in the systems;*
- *There was significant under-investment in some areas, particularly on new threats to indigenous biodiversity;*
- *There are about ten new species incursions in New Zealand each year”.*

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<sup>39</sup> (Anon. 2002a)

<sup>40</sup> (Anon. 2002a)

## **Pest Management**

Managing and controlling the pest and weeds already established in New Zealand represents over half of the total biosecurity expenditure annually, with the Department of Conservation (DOC) spending \$53 million and regional councils \$26 million. Despite recent advances in the prioritisation of pest management by both DOC and regional councils<sup>41</sup>, there is still insufficient national leadership and overview. The Council expects a review of the current system and the rationalisation of legislative tools for pest management, eventually leading to a long term containment of pests under appropriate sections of the Biosecurity Act 1993.

## **Part 4**

The Part of the Strategy paper consists of case studies of some recent incursions, the glossary, list of submitters and the bibliography. The case study for the biosecurity risks associated with sea containers is summarised as below:

### **2.6.3 Ministry of Agriculture and Forestry: Managing biosecurity risks associated with high-risk sea containers. Report by the Auditor General's office in 2006**

The objective of this report was to examine and inform Parliament and the public of the accuracy of the high risk profiling of sea containers and the subsequent inspections and decontamination. This was achieved by examining how MAF identifies and manages the biosecurity risks associated with high-risk containers focusing on three areas:

- The implementation of the Sea Container Import Health Standard;
- How MAF identifies the high risk containers; and
- How MAF ensures inspection and decontamination accuracy.

However, this audit did not include the IHS themselves, the procedures for managing the risks associated with the contents of the containers or the effectiveness of the management of low-risks containers, which are inspected by MAF accredited persons.

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<sup>41</sup> (Anon. 2002a)

### **The Sea Container Import Health Standard (IHS)**

The IHS for sea containers from all countries was introduced in September 2003 and fully implemented by 31 December 2003. The 2006 Auditor General's report found inconsistencies in the compliance with, and enforcement of the sea container IHS; including how MAF conducts self-audits of compliance and how MAF prosecutes non compliance.

The Auditor General's report also commented on the strain the new IHS caused on the communication between the two departments that are responsible for the management of sea containers, Biosecurity New Zealand (BNZ) (responsible for policy) and the MAF quarantine Service (responsible for implementing policy).

### **Risk profiling for sea containers**

The report found that the risk profiling conducted by the Border Management Group within BNZ was not as effective as it could be. Limitations in electronic resources were identified as a major factor. In particular, specific information needed for risk profiling is not available as an electronic resource. The computer system used by BNZ in risk profiling is the New Zealand Customs Service computer system; for which improvements are in progress. Quarantine declaration forms are also used in risk profiling; however, they need to accurately reflect the containers cleanliness, contents and packaging material to enable accurate profiling. Once the proposed auditing is fully implemented, the accuracy and usefulness of quarantine declaration forms can be verified.

### **Biosecurity clearance for high-risk containers**

Biosecurity clearance, the permission for goods and vessels to enter New Zealand, is given once the requirements of the IHS for sea containers from all countries are met to the satisfaction of a MAF inspector. The report found inconsistencies in the training of MAF inspectors. Inspectors were unable to meet workloads, no clear protocols are kept for contaminated containers, and the inspectors themselves are not subject to ongoing competency tests. An inspection is to be conducted inside the Quarantine Service areas within 14 hours of the container being unloaded from the vessel; the

report found that this time was frequently exceeded. Decontamination of containers (either cleaning or fumigation) is conducted in MAF approved facilities; however, the effectiveness of the fumigation is not audited nor are the audits conducted as regularly as MAF requires.

MAF has set up arrangements other than those specified in the IHS with some industry groups to manage the biosecurity clearance for their sea containers. These arrangements are known as “equivalent systems”. However, the report found there to be no guidance for the setting up of these equivalent systems or for auditing to ensure that these systems manage the biosecurity risks to a specific level.

### **Recommendations**

The 2006 Auditor General’s report made 15 recommendations, with the first five recommendations listed below:

- *Enforce the requirement of the IHS for Sea Containers from all Countries, i.e. for importers to provide information on the destination of a container once it leaves the wharf;*
- *Investigate and implement measures to secure greater compliance with the IHS for Sea Containers from All Countries;*
- *Ensure that processes are consistently followed for dealing with sea containers that arrive without or with incorrect quarantine declarations;*
- *Work with New Zealand Customs Service to address existing limitations for electronically recording biosecurity information of sea containers, and the inability to confirm that all high risk containers are being identified;*
- *Enter results of sea container checks by accredited persons into QuanCargo in a timely fashion.*<sup>42</sup>

## **2.7 Synopsis**

Given that biosecurity is a relatively new science, its definition is still unclear; with several other words being used for the same purpose, such as biosafety and biological

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<sup>42</sup> (Anon. 2006d) Page 10



security. These inconsistencies in conjunction with differing priorities between trading nations have lead to confusion in the international legislation and to subsequent trade disputes (see Chapters 4 and 9). In New Zealand, biosecurity focuses on preventing the introduction, intentional or accidental, of regulated or unwanted organisms. This is achieved through the implementation and enforcement of the Biosecurity Act in 1993 and subsequently the IHS for specific commodities, packaging material and freight containers (both sea and air). Monitoring New Zealand's border is the responsibility primarily of Biosecurity New Zealand, however, the New Zealand's Customs Service also plays a role in monitoring New Zealand's borders (see Chapters 5 and 6). The management systems in place are constantly being audited to provide the New Zealand Government and the public with an assurance that New Zealand's borders are adequately monitored.

## Chapter 3:

# New Zealand's Major Trading Partners

*“Although the value of merchandise imports may correlate well with measures of biological invasion, it is likely that knowledge of the volume, frequency, origin and destination of all imports as well as the mechanism by which goods are transported will help better characterise risks.” (Hulme 2009)*

### 3.1 Introduction

Since European colonisation, New Zealand has relied heavily on trade. Up until 1915, 90% of New Zealand's trade was with the United Kingdom and Australia. The percentage of trade with the United Kingdom started declining in the 1950s and today the UK receives about 10% of New Zealand's total exports. New Zealand now trades with a wider range of countries and with much larger volumes and since new trading initiatives also create new opportunities and new pathways for alien and invasive species (Green 2000) there has been an increase in unintentional introductions that arrive in association with visitors and traded commodities. There are two major transport methods used in international trade, air cargo containers and sea containers, however, due to the vast quantity of trade, the majority of traded commodities are transported with sea containers.

In the Year ending June 2004, New Zealand imported sea containers from a total of 135 different trading partners, with containers being shipped from a total of 924 different ports (unpublished MAF data). The number of sea containers entering New Zealand increased by approximately 180% over the last 12 years, with over 260, 000 full container load (FCL) containers and 160,000 empty containers entering New Zealand sea ports in the year ending June 2002 (Anon. 2003i).

The sea container pathway has been internationally recognised as the major pathway for most incursions resulting from international trade. In New Zealand the sea container pathway has been linked to most of the recent incursions (for example the

painted apple moth on imported used vehicles (Anon. 2002d)). The frequency of incursion detected has been linked with the increase in volume of cargo movement via the sea container pathway (Anon. 2002g), therefore trading partners will be assessed on volume traded and where possible in conjunction with commodities traded. Volume was chosen rather than value, as value traded has little reflection on potential biosecurity risks on any pathway. Commodity traded, although the most logical choice, was not chosen, as there is already a great deal of work done on the prevention, security clearance and inspection of commodities considered to be high risk goods, as there is with commodities and vessels from origins known to be of high risk (for example the development of Import Health Standards by the New Zealand Ministry of Agriculture and Forestry (MAF)).

### **3.2 New Zealand's Imports and Exports from 2002-2004**

International trade is expressed in terms of total value traded, volume trade and commodities; therefore trading partners are also generally assessed on the value traded, volume trade and commodities traded. For this research New Zealand's top five trading partners will be assessed by volume and value trade in order to clearly demonstrate the difference between the two. It is important to keep in mind that value or volume alone do not account for potential high biosecurity risk. With the sheer volume from some points of origin the risk of biosecurity breaches increases, despite that the container and cargo may be cleared as low risk, since there is an increased risk of contamination through probability alone.

#### **3.2.1 Value traded**

With the information available from Statistics New Zealand, the New Zealand's top five trading partners based on total trade value for the year ending June 2004 were (in descending order) Australia, United States of America (USA), Japan, The People's Republic of China (China) and the United Kingdom (UK). This ranking applies to both imports and exports. The percentage of New Zealand's total trade accounted for by these trading partners is summarised in Table 3.1.

**Table 3.1.** New Zealand Trade Profile Ranked by Export Value. Ranks are expressed in totals (NZ\$000, FOB for exports and CIF for imports) with percentage of total trade indicated in brackets, for the year ending June 2004 (Data source Statistics New Zealand).

Country	Export	Import	Total
Australia	5,737,530 (19.99%)	7,361,695 (22.05%)	13,693,867 (21.60%)
USA	4,212,937 (14.68%)	3,932,961 (11.78%)	8,693,867 (13.00%)
Japan	3,270,836 (11.40%)	3,849,932 (11.53%)	7,136,008 (11.30%)
China	1,580,293 (5.51%)	3,067,309 (9.19%)	4,686,473 (7.40%)
UK	1,412,188 (4.92%)	1,909,414 (3.27%)	2,538,484 (4.00%)
Top 5 total	16,983,786	19,302,211	36,285,998
Grand total	29,876,545	33,390,359	63,266,905

Total exports (excluding re-exports of \$1.2 billion) for the year ended June 2004 were \$30.04 billion, up by 3.4% (\$1.8 billion) on the year ended June 2003. Australia continues to be New Zealand's major exporting market, accounting for 20% (\$5.7 billion) of New Zealand's total exports (Table 3.2). Export to the USA, New Zealand's next biggest exporting market, which account for 15% (\$4.2 billion) of the total exports. New Zealand's third biggest export market is Japan, at 11% (\$3.3 billion) of total exports. Combined the top three export markets accounted for 44% of New Zealand's total exports by value.

Total imports increased from 1990 to 2004 by 3.8% to \$33.4 billion, an increase of \$1.23 billion. Imports from Australia continue to be New Zealand's biggest source, accounting for 22% of total imports (\$7.4 billion) in 2004 (Table 3.3). The United States and Japan were New Zealand's next biggest source of imports, accounting for 12% of total imports each in the same year. Combined the top three source markets accounted for 49% of New Zealand's total imports. Imports from the People's Republics of China continued to grow in 2004, increasing by 14%.

**Table 3.2.** Total New Zealand exports to New Zealand's five major trading partners (NZ\$ 000 FOB) for the years ending June 1990 until June 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand 2004).

Year	Country of Origin				
	Australia	USA	Japan	China	UK
1990	2,795,475	1,974,701	2,540,277	151,054	1,088,683
1995	4,009,382	1,943,876	3,387,862	528,878	1,208,552
1997	4,117,611	2,177,330	3,089,693	593,315	1,273,485
1998	4,407,947	2,780,618	2,959,437	658,886	1,214,227
1999	4,792,053	3,118,437	2,962,370	646,158	1,274,096
2000	5,561,175	4,135,848	3,935,161	927,628	1,384,086
2001	5,624,894	4,728,176	4,061,089	1,345,495	1,504,012
2002	6,326,468	4,921,650	3,732,483	1,434,263	1,579,663
2003	6,050,024	4,366,193	3,541,146	1,456,684	1,361,217
2004 <sup>P</sup>	5,737,530	4,212,937	3,270,836	1,580,293	1,412,188

**Table 3.3.** Total New Zealand imports from New Zealand's five major trading partners (NZ\$ 000 CIF) (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand 2004).

Year	Country of Origin				
	Australia	USA	Japan	China	UK
1990	3,228,846	2,823,497	2,467,968	190,467	1,159,561
1995	4,584,242	3,942,786	2,947,592	751,921	1,246,433
1997	5,515,990	3,880,028	2,579,515	1,022,871	1,116,406
1998	5,128,782	4,478,680	2,661,406	1,186,901	1,185,963
1999	6,536,181	4,494,342	3,358,038	1,431,634	1,103,409
2000	6,803,842	5,293,007	3,445,146	1,924,489	1,173,228
2001	6,938,659	5,042,329	3,493,441	2,207,386	1,218,184
2002	7,188,328	4,776,659	3,617,950	2,371,320	1,207,361
2003	7,277,947	4,067,042	3,876,249	2,687,376	1,120,450
2004 <sup>P</sup>	7,361,695	3,932,961	3,849,832	3,067,309	1,090,414

For the period June 2002 to June 2004, Australia was the major source of import values for five of New Zealand's six sea ports (Auckland, Tauranga, Wellington, Christchurch, Timaru and Dunedin) contributing between 18.22% (Auckland) and 39.17% (Tauranga) of total yearly import values (Table 3.4). The Port of Timaru is the exception, only receiving 4.75% of yearly value trade from Australia. The largest proportion, 20.31%, of yearly imported value for Timaru originated from Japan. Other large sources of import values for Auckland were Japan (14.41%) and China (10.86%); USA (24.52%) and China (5.57%) for Tauranga; for Wellington and Christchurch were Japan (23.12% and 20.31% respectively) and China (5.57% and

9.02% respectively); for Timaru were Republic of Korea (12.99%) and Australia (4.76%); and for Dunedin were Germany (9.88%) and Japan (7.45%). The countries listed in Table 3.4 contributed to at least 60% of total import values for all six New Zealand sea ports, ranging from 61.52% for Timaru to 90.96% for Wellington.

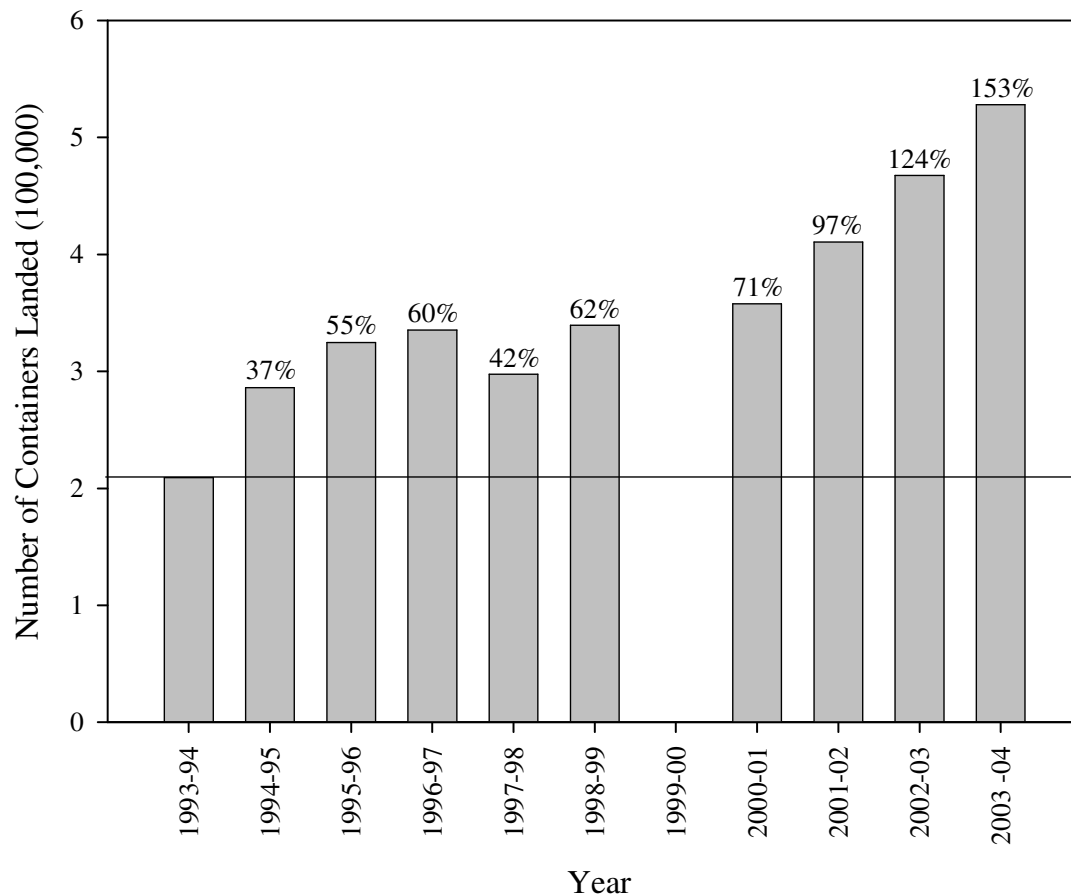
**Table 3.4.** A yearly average of Total value of imports from countries of origin for six New Zealand seaports for the years 2002 until 2004 (NZ\$ million), with percentage of total import value per port indicated in brackets, for countries with >1% of total incoming containers. (\* Republic of Korea).

Country	New Zealand Sea Port					
	Auckland	Tauranga	Wellington	Christchurch	Timaru	Dunedin
Australia	261.02 (18.22)	98.36 (39.17)	65.73 (35.06)	61.89 (28.99)	1.22 (4.76)	5.62 (22.26)
China	155.54 (10.86)	13.98 (5.57)	9.56 (5.10)	19.26 (9.02)	0.76 (2.96)	1.41 (5.59)
USA	136.21 (9.51)	61.57 (24.52)	7.18 (3.83)	9.76 (4.57)	1.04 (4.08)	0.81 (3.20)
Singapore	19.93 (1.39)	6.48 (2.58)	4.05 (2.16)	4.55 (2.13)	0.19 (0.75)	0.43 (1.76)
Japan	206.35 (14.41)	9.61 (3.83)	43.35 (23.12)	40.98 (19.19)	5.19 (20.31)	1.88 (7.45)
Hong Kong	7.621 (0.53)	0.55 (0.22)	0.39 (0.21)	0.75 (0.35)	0.01 (0.03)	0.01 (0.03)
Thailand	34.79 (2.43)	2.37 (0.94)	5.51 (2.94)	3.34 (1.56)	0.17 (0.67)	0.17 (0.68)
Indonesia	20.99 (1.47)	2.08 (0.83)	3.32 (1.77)	3.94 (1.84)	0.09 (0.37)	1.06 (4.19)
Malaysia	30.96 (2.16)	2.71 (1.08)	3.01 (1.60)	4.36 (2.04)	0.62 (2.42)	0.33 (1.29)
Netherlands	18.35 (1.28)	1.07 (0.42)	1.43 (0.76)	1.21 (0.57)	0.14 (0.55)	0.49 (1.92)
Germany	95.22 (6.65)	2.68 (1.07)	7.28 (3.88)	8.88 (4.16)	0.74 (2.89)	2.49 (9.88)
UK	64.12 (4.48)	2.00 (0.80)	3.96 (2.11)	5.40 (2.53)	0.73 (2.87)	0.76 (3.01)
Korea*	39.80 (2.78)	4.03 (1.60)	7.98 (4.26)	5.28 (2.47)	3.32 (12.99)	0.39 (1.54)
Italy	47.85 (3.34)	1.69 (0.67)	2.00 (1.07)	4.06 (1.90)	0.81 (3.16)	1.15 (4.57)
Taiwan	32.62 (2.28)	3.32 (1.32)	4.37 (2.33)	4.38 (2.05)	0.38 (1.50)	0.58 (2.28)
Belgium	21.90 (1.53)	0.53 (0.21)	1.39 (0.74)	1.41 (0.66)	0.31 (1.22)	0.42 (1.67)
Total	1193.28 (83)	213.01 (85)	170.53 (91)	179.45 (84)	15.72 (62)	18.00 (71)
Grand Total	1432.47	251.10	187.48	213.51	25.56	25.25

In summary, in terms of value traded on a national level, New Zealand's top three major trading partners for the year ending June 2004 were Australia, USA and Japan, with the top three accounting for 47% of New Zealand's total value traded. In contrast, on a port level, the ranking varied depending on ports. However, Australia was still the most predominant trading partner, accounting for the largest import values traded for five of the six sea ports. Japan was also a major source of import value traded for five of the six ports, contributing either the second or third largest of import value traded. The USA, however, only accounted for a large proportion import value trade for one sea port, Tauranga. Auckland sea port accounted for the highest import values (NZ\$ 1432.47 million), with Dunedin accounting for the lowest at NZ\$ 25.25 million.

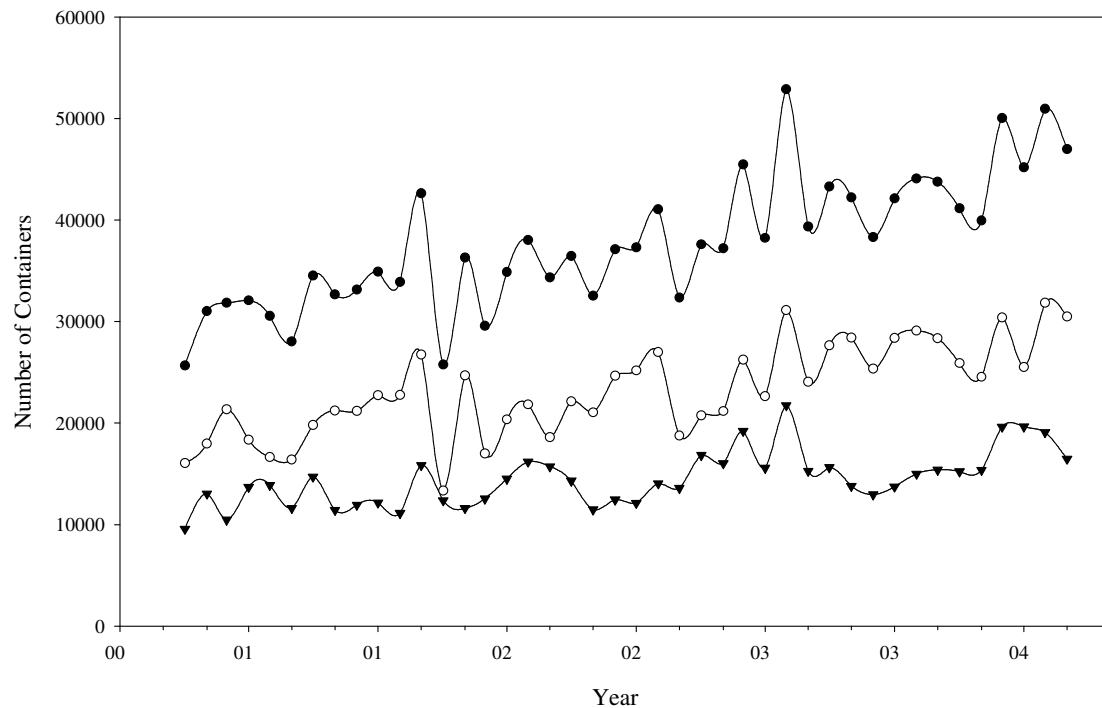
### 3.2.2 Volume Traded

There has been a steady increase in the number of sea containers entering New Zealand for the past ten years (Figure 3.1). With the total number of containers entering New Zealand for the year ending June 2004 having increased 153% from the year ending June 1994.



**Figure 3.1.** Total annual containers landed in New Zealand from 1993 until 2004, with percentage increase since 1993-94 (the baseline) displayed above respective columns. (Data source MAF 2004).

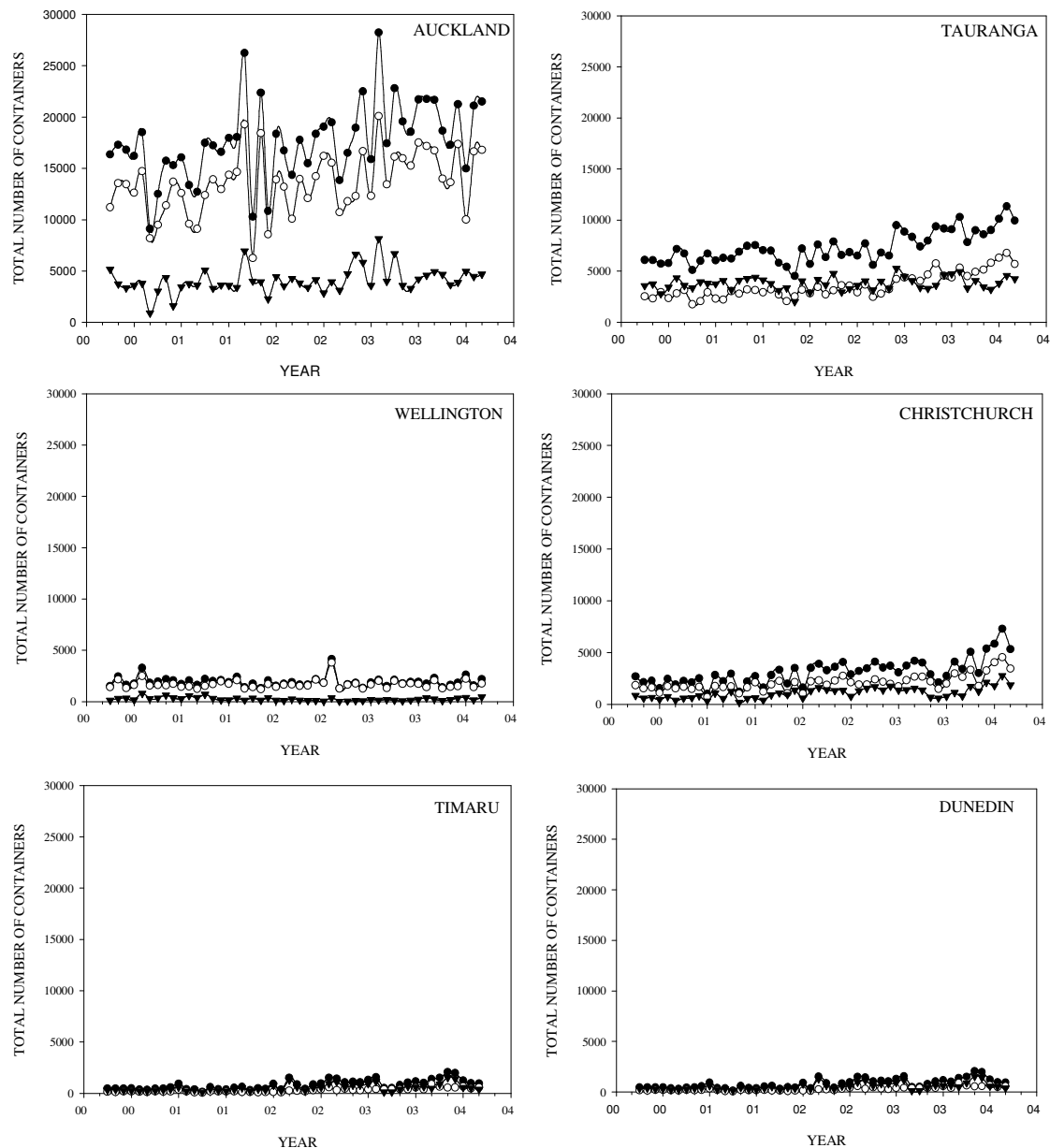
The distribution of FCL (Full Container Load) and Empty containers for the period 2000 until 2004 showed that there is an overall increase in the number of containers entering New Zealand over the four year period (Figure 3.2). The number of FCL containers entering exceeds that of Empty containers, although they show a corresponding increase. The seasonal fluctuations in the total number of containers entering New Zealand were mostly driven by the number of FCL entering.



**Figure 3.2.** Total monthly containers entering New Zealand for the period of June 2000 until June 2004; Total Numbers (●), FCL (○) and Empties (▼). (Data source MAF 2004)

The distribution of the containers entering through six of New Zealand's sea ports shows that the majority of container movement for the period 2000 until 2004 appeared to occur in Auckland, which accounted for 48.2% of the total number of containers entering New Zealand (Figure 3.3). For Auckland there also appeared to be a marked difference between the number of FCL containers and Empty containers entering. The next biggest port was Tauranga, which accounted for 20% of the total container entering New Zealand. Although in contrast to Auckland, there was little difference in the overall number of FCL and Empty containers entering (however, there were some seasonal fluctuations in numbers of FCL, empty and total containers arriving). The smallest number of containers entering New Zealand occurred in ports of Timaru and Dunedin, with both ports receiving less than 5000 containers from 2000 until 2004.





**Figure 3.3.** Total numbers of containers entering New Zealand per port of entry for the period Jan 2000 until June 2004. Total Numbers (●), FCL (○) and Empties (▼) (Data source MAF 2004).

The distribution of the countries of origin for the total number of containers entering New Zealand for the first half of 2004 shows that, based on total volume traded (the number of containers entering), New Zealand's top five trading partners for 2004 were (in descending order) Australia (32.33% of the total volume traded), China (10.19%), USA (6.21%), Singapore (3.51%) and Japan (3.24%) (Table 3.5). It is interesting to note that the third biggest proportion (6.22%) of containers entering New Zealand in 2004 come from unknown origins a total of 13959 containers (unpublished MAF data). Table 3.6 also lists the number of ports that the containers

originated from per country exporting to New Zealand. China had the highest number of different ports (84) exporting to New Zealand followed by USA (54), Malaysia (52), and Indonesia and UK (44), with Korea (south), Hong Kong, and Belgium having the least number of ports exporting to New Zealand (1, 2 and 4 respectively).

**Table 3.5.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering New Zealand for the first half for 2004 for the top ten importing countries. (Data source MAF 2004)

Country	Number of Ports	Monthly average	% of Total	Total
Australia	27	8829	32.33	70632
China	84	2781.6	10.19	22253
Unknown	n/a	1699.4	6.22	13595
USA	58	1696.1	6.21	13569
Singapore	4	959	3.51	7672
Japan	54	884.9	3.24	7079
Hong Kong	2	873.6	3.2	6989
Thailand	14	846.8	3.1	6774
Indonesia	44	818.5	3	6548
Malaysia	52	759.6	2.78	6077
Netherlands	5	728.5	2.67	5828
Germany	24	667.5	2.44	5340
UK	44	666.6	2.44	5333
Korea - south	1	677.4	2.17	4742
Italy	31	560.6	2.05	4485
Taiwan	5	488.3	1.79	3906
Belgium	4	302	1.11	2416
Total	453	24239.4	88.46	193238
Grand Total	924	27306.1		218448

The largest proportion of containers entering Auckland in the first half of 2004 originated from Australia (27.31% of total containers) (Table 3.6), followed by China (11.31%) and USA (42%). The number of containers arriving from 'unknown countries' accounted for 7.48% of total containers entering Auckland with a total of 9600 containers in 2004. China had the highest number of ports exporting to New Zealand through Auckland (74) followed by USA (42), Japan (41) and then Australia (22).

**Table 3.6.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering the New Zealand sea port of Auckland for the first half for 2004 for the top ten importing countries. (Data source MAF 2004).

Country	Number of Ports	Monthly average	% of Total	Total
Australia	22	4379.25	27.31	35034
China	74	1813.25	11.31	14506
USA	42	1313.63	8.19	10509
Unknown	n/a	1200.00	7.48	9600
Hong Kong	2	609.88	3.80	4879
Singapore	3	569.50	3.55	4556
Netherlands	3	508.50	3.17	4068
Japan	41	485.88	3.03	3887
Thailand	9	468.00	2.92	3744
Germany	18	447.25	2.79	3578
Total	76	11795.13	73.56	94361
Grand Total	730	16033.75		128270

Table 3.7 displays the number of containers entering New Zealand through the sea port of Tauranga for the top ten countries of origin during the first half of 2004. Again, the largest proportion of containers entering New Zealand through Tauranga for the same period originated from Australia (42.8%), followed by China (6.52%) and USA (5.12%) (Table 3.7). As with Auckland, a large proportion of containers arriving at Tauranga were from 'unknown origin' (8.12%) and of the top ten countries China had the highest number of ports exporting to Tauranga (41), with USA exporting from 23 ports and Australia 15.

Containers originating from Australia made up the largest proportion (42.75%) of containers entering New Zealand through Wellington sea port in the first half of 2004, with China totalling (8.39%) and Japan (5.33%) (Table 3.8). In contrast to Auckland and Tauranga, containers that originated from 'unknown countries' were not in the top ten; accounting for only 0.88% of total containers arriving. Among the top ten countries China had the highest number of ports exporting containers to Wellington (44) followed by Malaysia (16) and Japan (15).

**Table 3.7.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering the New Zealand sea port of Tauranga for the first half for 2004 for the top ten importing countries. (Data source MAF 2004)

Country	Number of Ports	Monthly Average	% of Total	Total
Australia	15	1664.63	42.72	13317
Unknown	n/a	316.5	8.12	2532
China	41	254.13	6.52	2033
USA	23	199.63	5.12	1597
Thailand	7	153.5	3.94	1228
Indonesia	16	148.13	3.80	1185
Singapore	3	146.88	3.77	1175
Malaysia	15	100.13	2.57	801
Papua New Guinea	8	94.13	2.42	753
Hong Kong	1	91.13	2.34	729
Total	129	3168.75	81.33	25350
Grand Total	370	3896.25		31170

**Table 3.8.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering the New Zealand sea port of Wellington for the first half for 2004 for the top ten importing countries. (Data source MAF 2004)

Country	Number of Ports	Monthly Average	% of Total	Total
Australia	9	868.38	42.75	6947
China	44	170.50	8.39	1364
Japan	15	108.25	5.33	866
Indonesia	14	100.50	4.95	804
Malaysia	16	97.88	4.82	783
Korea - south	1	89.86	3.87	629
Thailand	5	74.38	3.66	595
Singapore	2	58.75	2.89	470
Hong Kong	1	46.13	2.27	369
Taiwan	5	44.38	2.18	355
Total	112	1658.98	81.11	13182
Grand Total	268	2031.50		16252

For the first half of 2004, containers originating from Australia recorded the largest proportion (43.31%) of containers arriving in Lyttelton followed by China (10%) and Indonesia (5.20%) (Table 3.9). Containers entering New Zealand through Lyttelton from 'unknown origins' made up 4.23 % (604 containers) of the total containers arriving in New Zealand in 2004. Of the top ten countries, China exported containers from the highest number of ports (37), with Australia from 15, and Indonesia, Japan, and Malaysia from 10 ports.

**Table 3.9.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering the New Zealand sea port of Lyttelton, Christchurch, for the first half for 2004 for the top ten importing countries. (Data source MAF 2004)

Country	Number of Ports	Monthly Average	% of Total	Total
Australia	15	772.13	43.31	6177
China	37	178.25	10.00	1426
Indonesia	10	92.625	5.20	741
Unknown	n/a	75.50	4.23	604
Japan	10	73.25	4.11	586
Malaysia	10	67.63	3.79	541
Thailand	5	65.63	3.68	525
Singapore	5	65	3.65	520
Korea - south	1	70	2.94	420
Hong Kong	1	50.25	2.82	402
Total	32	1510.25	83.73	11942
Grand Total	228	1782.88		14263

At the port of Timaru, containers originating from China made up the largest proportion (18.50%) of total containers arriving in the first half of 2004, followed by Japan (12.30%) and UK (9.86%) (Table 3.10). Containers arriving from 'unknown countries' contributed 7.42% of the total containers entered New Zealand in 2004 through Timaru. Of the top ten countries exporting into Timaru, China export from the highest number of differing ports (17), followed by Italy (11) then Japan with 10.

**Table 3.10.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering the New Zealand sea port of Timaru for the first half for 2004 for the top ten importing countries. (Data source MAF 2004)

Country	Number of Ports	Monthly Average	% of Total	Total
China	17	66.38	18.50	531
Japan	10	44.13	12.30	353
UK	7	35.38	9.86	283
Unknown	n/a	26.63	7.42	213
Finland	5	19.38	5.40	155
Korea - Republic	2	19.13	5.33	153
Korea - South	1	21.86	5.33	153
Netherlands	1	17	4.74	136
Germany	3	16.63	4.63	133
Italy	11	10.50	2.93	84
Total	57	276.98	76.42	2194
Grand Total	152	358.88		2871

In the year ending June 2004 containers originating from Australia accounted for the largest proportion (39.15%) of containers entering New Zealand through Dunedin, followed by the UK (9.39%) and the Netherlands (7.49%) (Table 3.11). Containers arriving from 'unknown origins' only accounting for 0.98% of containers entering New Zealand through Dunedin, with a total of 45 containers arriving in 2004. Of the top ten countries, China exported from the largest number of ports (21), Australia and Italy from 10 each and the UK from 7.

**Table 3.11.** Country of Origin, number of ports per country of origin, average number of containers landed per month, proportion of total containers landed and total containers landed, entering the New Zealand sea port of Dunedin for the first half for 2004 for the top ten importing countries. (Data source MAF 2004)

Country	Number of Ports	Monthly Average	% of Total	Total
Australia	10	224.13	39.15	1793
UK	7	53.75	9.39	430
Netherlands	1	42.88	7.49	343
China	21	34.63	6.05	277
Germany	3	34.13	5.96	273
Indonesia	5	31.38	5.48	251
Singapore	1	19.88	3.47	159
Malaysia	5	17.13	2.99	137
Vietnam	2	16.13	2.82	129
Italy	10	13.50	2.36	108
Total	65	487.50	85.15	3900
Grand Total	147	572.50		4580

In summary, Australia, China and USA were New Zealand's top three international trading partners in terms of volume trade (incoming containers) for the first half of 2004. The order of the top three differed, however, when containers entering New Zealand were examined at a port level. Despite some changes in the order, Australia remains the predominant origin of containers throughout New Zealand for the first half of 2004, being the largest source of containers for five out to the top six New Zealand sea ports. China was also a large contributor, being present in the top three sources of containers for five out of the top six New Zealand sea ports. However, USA was only present in the top three countries for two of the six New Zealand sea ports.

China exported from the largest number of domestic ports to New Zealand. USA and Australia were also among the countries exporting from high numbers of respective domestic ports, although their numbers were remarkable lower than those of China.

### 3.2.3 Trade commodity

The distribution of HS commodities categorised<sup>43</sup> from each exporting country (with proportion of containers entering NZ >1%) through six of New Zealand's sea ports showed that Auckland had the highest average number of commodity categories imported (89) while Dunedin had the lowest average (29) (Table 3.12). China exported the highest average number of commodity categories (79) throughout the six New Zealand seaports, followed by Australia with 78 and USA with 68.

**Table 3.12** The average number of imported commodities (HS2) per country of origin (> 1% of containers) for the six major ports in New Zealand for the years ending June 2002 until June 2004, in descending alphabetical order. New Zealand's top three trading partners based on volume traded are represented in bold type. (Data source Statistics New Zealand 2004)

Country	New Zealand Sea Port						Average
	Auckland	Tauranga	Wellington	Christchurch	Timaru	Dunedin	
<b>Australia</b>	<b>97</b>	<b>96</b>	<b>83</b>	<b>92</b>	<b>30</b>	<b>68</b>	<b>77.67</b>
Belgium	72	48	38	44	19	32	42.17
<b>China</b>	<b>95</b>	<b>87</b>	<b>89</b>	<b>90</b>	<b>59</b>	<b>54</b>	<b>79.00</b>
Germany	94	66	57	64	49	41	61.83
Hong Kong	85	67	45	49	12	5	43.83
Indonesia	76	68	61	64	31	26	54.33
Italy	88	69	58	67	38	35	59.17
Japan	87	61	59	68	60	19	59.00
Korea	88	54	60	80	51	12	57.50
Malaysia	81	60	55	57	14	10	46.17
Netherlands	87	50	55	62	31	23	51.33
Singapore	73	50	32	48	14	9	37.67
Taiwan	89	63	53	74	31	21	55.17
Thailand	87	69	63	71	30	29	58.17
UK	94	72	68	74	60	39	67.83
<b>USA</b>	<b>95</b>	<b>92</b>	<b>76</b>	<b>81</b>	<b>22</b>	<b>39</b>	<b>67.50</b>
Average	86.75	67.00	59.50	67.81	34.44	28.88	

<sup>43</sup> Categories are classified in accordance with international standards, the Harmonised System Commodity Description and Coding System; referred to as The Harmonised System or HS codes, for this research the HS2 codes were used, which contains 97 categories (<http://www.stats.govt.nz>)

Although the ranking of the top three imported commodities changes between 1998 and 2004 (Table 3.13), the top three imported commodities were Vehicles, Machinery and Electrical Machinery until 2000, with Mineral Fuels replacing Electrical Machinery thereafter. Of the total imported commodities the top three for 2004 were Vehicles (16.02% of total imported commodities), Machinery (13.58%) and Mineral Fuels (9.37%).

**Table 3.13.** Percent of total for the top ten import commodities for the years ending June from 1998 to 2004 imports, in descending order for 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand 2004)

HS code	Commodity	Year						
		1998	1999	2000	2001	2002	2003	2004 <sup>P</sup>
87	Vehicles	10.19	12.31	12.31	11.48	13.80	15.50	16.02
84	Machinery	15.70	14.21	13.04	12.88	13.74	13.47	13.58
27	Mineral Fuels	6.05	5.68	7.94	11.15	9.02	9.80	9.37
85	Electrical Machinery	10.28	10.41	10.06	10.62	8.82	8.39	9.33
39	Plastic	4.29	4.11	4.08	4.19	4.13	3.98	3.67
88	Aircraft	1.70	3.31	5.15	2.77	2.61	2.50	3.39
90	Photographic	3.31	3.14	2.90	3.08	3.10	3.01	3.10
48	Paper	2.95	3.05	2.85	2.85	2.94	2.87	2.80
30	Pharmaceutical	2.75	2.81	2.48	2.45	2.40	2.32	2.36
72	Iron and steel	1.64	1.45	1.38	1.41	1.54	1.53	1.63

In contrast to imported commodities, the ranking for exported commodities remained constant from 1998 until 2004 (Table 3.14). The top three export commodities for 2004 were Dairy (17.94% of total exported commodities), Meat (15.61%) and Wood (7.22%).

In summary, Auckland Sea Port received on average the largest variation of commodities for the first half of 2004, with Australia, China and USA exporting commodities from between 95–97 of the 97 HS2 categorises. For the year ending June 2004, Vehicles, Machinery and Mineral Fuels (HS2 codes 87, 84 and 27 respectively) were the top three commodities imported, with Dairy, Meat and Wood (HS2 codes 04, 02 and 44 respectively) being New Zealand's major exported commodities.



**Table 3.14.** Percent of total exports for the top ten exports commodities for the years ending June from 1998 to 2004, in descending order for 2002 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand 2004)

HS Code	Commodity	Year						
		1998	1999	2000	2001	2002	2003	2004 <sup>P</sup>
04	Dairy	17.08	17.44	15.73	18.75	19.04	16.69	17.94
02	Meat	13.56	13.02	13.58	13.50	14.24	14.56	15.61
44	Wood	6.72	6.88	8.13	7.07	7.64	8.44	7.22
08	Fruit	4.17	4.88	3.91	3.37	3.72	3.65	4.37
84	Machinery	3.99	3.89	3.80	3.45	3.64	3.99	4.34
03	Fish	4.81	5.42	4.94	4.43	4.50	4.30	3.87
76	Aluminium, Articles	4.47	4.39	4.48	4.17	3.78	3.46	3.50
98	NZ misc. Provisions	-	-	-	-	0.37	4.27	3.35
11	Starch	3.60	4.20	4.00	4.66	4.45	4.06	3.34
51	Wool	4.77	3.93	3.73	3.25	3.03	3.34	3.09

### 3.3 New Zealand's Major Trading Partners

From the above import and export data, the majority of New Zealand's trade is with Australia, followed by China and the USA. To provide an overview of the potential for biosecurity risks involved with these trading partners a more detailed description of New Zealand's trade with these three trading partners is summarised below, in descending order of proportion of total trade.

#### 3.3.1 Australia

Motor Vehicles, Petroleum Oil (not crude) and Aluminium oxides were New Zealand's major imports from Australia for the year ending June 2004 (Table 3.15). However, the ranking of the top three commodities varies between years. Motor Vehicles was the only of the top three commodities for which imports increased (24.22%) between 2002 and 2004, with Petroleum Oil and Aluminium oxide both showing a decrease of import greater than 10% (19.87% and 11.01% respectively). The majority of imported commodities showed an increase (excluding Petroleum Oil (not crude and crude) and Aluminium oxide); computers showed the greatest increase in imports, increasing by 178.41%, while Petroleum oil (crude) showed the greatest decrease (26.47%).

**Table 3.15.** Top ten imports commodities (HS4) from Australia for the years ending June from 2002 to 2004, in descending order for 2004, with the percent change calculated between 2002 and 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand) (NZ\$ 000 CIF)

HS coding	Commodity	Year			% Change
		2002	2003	2004 <sup>P</sup>	
8703	Motor Vehicles	462571	565774	574618	24.22
2710	Petroleum oil (not crude)	618118	657070	495297	-19.87
2818	Aluminium oxide	277224	238059	246715	-11.01
2709	Petroleum oil crude	313241	222232	230321	-26.47
3004	Medicaments	180326	187540	211679	17.39
8471	Computers	58434	111169	162688	178.41
8704	Trucks and Vans	87179	119019	128316	47.19
2204	Wine	106651	117572	118786	11.38
4818	Paper towels, etc	89349	87606	111932	25.28
8524	Records, Tapes, etc	84130	84964	107333	27.58

In the year ending June 2004, Timber, Gold and Petroleum Oil (crude) were New Zealand's major exports to Australia (Table 3.16). As with New Zealand's imports from Australia, the order of ranking of the top three varies for the three years, however, the top three commodities remained the same. Exports of both Timber and Gold between 2002 and 2004 increased by less than 10% (5.25% and 0.74% respectively), while Petroleum Oil (crude) exported decreased by 41.81%. The majority of exports increased with the exception of Petroleum Oil (crude), Cheese, Live horses and Chemical wood pulp. Cruise Ships, ferry boats showed the greatest increase, increase from the export value of \$414,000 in 2002 to \$91,024,000 in 2004; a 21886.47 % increase.

**Table 3.16.** Top ten exports commodities (HS4) to Australia for the years ending June from 2002 to 2004, in descending order for 2004, with the percent change calculated between 2002 and 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand) (NZ\$ 000 FOB)

HS coding	Commodity	Year			% Change
		2002	2003	2004 <sup>P</sup>	
4407	Timber	228926	247987	240946	5.25
7108	Gold	238095	213281	239857	0.74
2709	Petroleum oils crude	398658	339853	231970	-41.81
0406	Cheese	167008	147232	136205	-18.44
8418	Refrigerators, freezers, etc	110287	113054	111769	1.34
5703	Carpets, tufted	72186	87371	92915	28.72
8901	Cruise ships, ferry-boats	414	61	91024	21886.47
0101	Live horses	91132	69808	84190	-7.62
4703	Chemical wood pulp	109955	101229	83006	-24.51
2106	Food preparations	53883	51691	81602	51.44

### 3.3.2 People's Republic of China (China)

Computers, Suits (women's or girl's) and toy/models were the New Zealand's top three imports from China for the year ending June 2004 (Table 3.17). The ranking order of the top three imports was the same for 2002 to 2004, with the exception of Toys/models being replaced with Jersey in 2003. All commodities (with the exception of Jersey) showed increases during 2002 to 2004, with the import of Transmission apparatus increasing fourfold, from the import value of \$18,516,000 in 2002 to \$73,679,000 in 2004, (297.92%). Jersey etc showed the only decrease (-0.92%).

In the year ending June 2004, Milk powder, Wool and Logs were New Zealand's top three exports to China (Table 3.18). The ranking of the commodities, as with imports, remained the same for 2003 and 2004 but differed for 2002. Milk powder was the only of the top three commodities that showed an increase in exports from 2002 to 2004 (75.52%) while the export of Wool and Logs decrease by 23.71% and 12.61% respectively. The majority of imports showed an increase, with the exception of Wool, Logs and Sheep meat (23.71%, 12.61% and 2.51% respectively); Milk powder showed the greatest increase (75.52%) followed by Fats of animals (68.20%), while Wool showed the greatest decrease in imports at 23.71%.

**Table 3.17.** Top ten imports commodities from China for the years ending June from 2002 to 2004, in descending order for 2004, with the percent change calculated between 2002 and 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand) (NZ\$ 000 CIF)

HS code	Commodity	Year			% Change
		2002	2003	2004 <sup>P</sup>	
8471	Computers	119856	145887	216706	80.81
6204	Suits; women's or girls	86721	98864	102634	18.35
9503	Toys; models	69407	72689	78442	13.02
6110	Jerseys etc	74836	67108	74147	-0.92
8525	Transmission apparatus	18516	41503	73679	297.92
6403	Footwear; rubber, plastic etc	67074	68807	71735	6.95
6109	T-shirts etc	61759	63009	71690	16.08
8516	Electric heaters and dryers	54217	58955	62644	15.54
8528	Television receivers	34002	40838	60242	77.17
4202	Trunks and cases	52966	52614	56571	6.81

**Table 3.18.** Top ten exports commodities to China for the years ending June from 2002 to 2004, in descending order for 2004, with the percent change calculated between 2002 and 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand) (NZ\$ 000 FOB)

HS code	Commodity	Year			% Change
		2002	2003	2004 <sup>P</sup>	
0402	Milk powder	179361	266858	314812	75.52
5101	Wool	216286	149695	165010	-23.71
4403	logs	118563	134210	103617	-12.61
4703	Chemical wood pulp	80381	41451	86522	7.64
0504	Offal	54000	71739	77459	43.44
1502	Fats of animals	36442	47110	61294	68.20
4102	Raw skins, sheep	49904	65196	58146	16.52
0204	Sheep meat	49284	48769	48049	-2.51
4701	Wood pulp	37242	34113	47139	26.57
4407	Timber	41385	43171	46668	12.77

### 3.3.3 United States of America (USA)

The top three commodities imported from the USA (HS4 codes) were Aircraft, Computer and Aircraft parts in the year ending June 2004 (Table 3.19). The ranking order for the top three commodities remained the same for all three years. In contrast to Australia and China, the majority of commodities imported show a decrease between June 2002 and June 2004, with the exception of Motor vehicles, Electric generating sets and Trucks and Vans (increasing 0.22%, 2424.52% and 12.88% respectively). Telephone equipment was the commodity which showed the greatest decrease in imports (-39.40%) while Electric generating sets showed the greatest

increase, increasing from the import value of \$3,381,000 in 2002 to \$85,354,000 in 2004.

**Table 3.19.** Top ten imports commodities from USA for the years ending June from 2002 to 2004, in descending order for 2004, with the percent change calculated between 2002 and 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand) (NZ\$ 000 CIF)

HS code	Commodity	Year			% Change
		2002	2003	2004 <sup>P</sup>	
8802	Aircraft	502769	469722	330121	-34.34
8471	Computers	252081	233247	212102	-15.86
8803	Aircraft; parts	188028	115614	126724	-32.60
8473	Machinery; parts	152108	124250	115633	-23.98
9018	Medical or veterinary instruments	121426	107030	110655	-8.87
8703	Motor vehicles	110192	136144	110433	0.22
8502	Electric generating sets	3381	4190	85354	2424.52
8704	Trucks and Vans	53414	44459	60289	12.88
8411	Turbo-jets	61789	21671	55752	-9.77
8517	Telephone equipment	84451	73391	51174	-39.40

Frozen beef, Casein and Sheep were the top three commodities (HS4 codes) New Zealand exported to the USA in the year ending June 2004 (Table 3.20). The ranking order for the years 2002 and 2003 were the same although they differed from the order for 2004, with Timber replacing Sheep meat until 2004. As with New Zealand's imports from USA, the majority of New Zealand's exports to the USA decreased between the years ending June 2002 and June 2004, with the exception of Sheep meat, Apples and Wines (increasing by 4.96%, 4.36% and 62.93% respectively). Both Timber and Fish fillets showed the greatest decrease (-44.58% and -41.25% respectively), while Wines showed the largest increase, increasing from the export value of \$48,237,000 in 2002 to \$78,594,000 in 2004.

**Table 3.20.** Top ten exports commodities to USA for the years ending June from 2002 to 2004, in descending order for 2004, with the percent change calculated between 2002 and 2004 (<sup>P</sup> refers to provisional data) (Data source Statistics New Zealand) (NZ\$ 000 FOB)

HS code	Commodity	Year			% Change
		2002	2003	2004 <sup>P</sup>	
0202	Frozen beef	994147	829624	888086	-10.67
3501	Casein	565027	457623	364939	-35.41
0204	Sheep meat	232828	233057	244375	4.96
4407	Timber	286700	356092	158901	-44.58
0406	Cheese	255061	147065	125360	-50.85
8903	Yachts and other vessels	60770	37464	92508	52.23
0304	Fish fillets	156637	129401	92019	-41.25
0808	Apples	84555	64595	88240	4.36
8708	Motors vehicles; parts	111264	123163	79980	-28.12
2204	Wine	48237	67411	78594	62.93

### 3.4 Synopsis

The number of sea containers entering New Zealand has been increasing steadily over the past decade, with recorded increases of approximately 150-180% (unpublished data MAF 2004) (Anon. 2003i). With this increase in container numbers there has been an associated increase in biosecurity risks (Vitousek *et al.* 1997, Anon. 2003i, Levine and D'Antonoio 2002, Meyerson and Mooney 2007). The risks associated with sea containers include the containers themselves (Bulman 1998, Anon. 2002f), the cargo (Bulman 1992, Gadgil and Bulman 2002), the packaging material and the accuracy of manifest descriptions for contents and packaging (Anon. 2003i).

As the biosecurity risk associated with trade is more dependent on the numbers of containers entering, the contents of the containers and the origin of the containers than on the value of trade (Hulme 2009); for the purpose of this research, New Zealand's top three trading partners were determined by the number of containers entering New Zealand per country. Therefore, Australia, China and USA will, for the purpose of this study, be considered New Zealand's three major trading partners.

#### AUSTRALIA

Australia exported a total of 70,632 containers to New Zealand in the first half 2004, from a total of 27 different ports containing commodities from all of 97 of the HS2

commodity categories, into all six of New Zealand's major sea ports and accounted for 32% of New Zealand's total containers imported of the first half of 2004. While the majority of imports from Australia arrive in New Zealand via sea containers, commercial cargo does arrive via airfreight and in March 2001 a Red Imported Fire Ant nest was discovered on the grounds of the Auckland International Airport near an area where air cargo crates were stored. Two days prior to the discovery in Auckland, a nest was discovered in Brisbane, Australia (Anon. 2002e), and the import pathway was identified, although no direct link to a pathway was proven.

It is reported that Australia intercepts a larger number of potentially invasive species associated with imports, including approximately 600 insect species annually (Maynard 2004). For example in 1998 the Monterey Pine Aphid (*Essigella californica*) was intercepted in Sydney, Australia on avocados imported from New Zealand. As the aphid was not reported to be feeding on the avocados themselves, this intercept highlights the occurrence of hitchhiking of invasive species on non-host material (Maynard 2004).

## CHINA

China exported a total of 22,253 containers to New Zealand in the first half of 2004, from a total of 84 different domestic ports. Goods included 95 of the 97 HS2 commodity categories, with computers, Women's and Girl's Suit, and Toys/Model being the top three commodities. The total import from China had a yearly value of NZD\$3.067 billion for the year ending June 2004, with containers arriving in all six of New Zealand's major sea ports and accounting for 10% of the total number of containers arriving in New Zealand for the first half of 2004. While there have not been any reported incursions in New Zealand linked directly to China, there are several species native to China that are now classed as invasive species elsewhere, for example Asian long-horn beetle (*Anoplophora glabripennis*) which was identified on hardwoods in Brooklyn, New York, U.S.A in 1996<sup>44</sup>, the emerald ash borer (*Agrilus Planipennis*), which was identified in Ohio, U.S.A in 2003<sup>45</sup>, the multiflora rose (*Rosa multiflora*), which was intentionally introduced into the U.S.A but was recently

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<sup>44</sup> [http://www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/asian\\_lhb/index.shtml](http://www.aphis.usda.gov/plant_health/plant_pest_info/asian_lhb/index.shtml)

<sup>45</sup> <http://www.agri.ohio.gov/eab/>

classed as a invasive species<sup>46</sup> and the white pine blister rust (*Cronartium ribicola*) which was introduced into the United States about 1900<sup>47</sup> (Ding *et al.* 2008).

## THE UNITED STATES OF AMERICAN

The USA exported a total of 13,569 containers to New Zealand in 2004 from a total of 58 different domestic ports, with containers arriving at all six of New Zealand's major sea ports and accounting for 6.22% of total containers entering New Zealand. The commodities imported included 95 of the 97 HS2 commodity categories, aircraft, computers and aircraft parts being the top three commodity categories (by volume) that New Zealand imported. The total imports from USA had a yearly value of NZD\$ 4.212 billion for the year ending June 2004.

While machinery parts and computers were the major imports from The USA, New Zealand also imported a wide range of consumable products including Table Grapes from California (to the value of \$8 million per annum). In October 2000 and again in November 2000, live spiders (including the black widow spider) were found in bunches of Californian Table Grapes. As a result, imports of the grapes were suspended and importation standards were altered to further increase the pre-shipment, during shipment and border treatments in order to reduce the possibility of incursions (Anon. 2002b).

Regardless of value or volume traded, the top five origins of biosecurity risk cargo for the year 2001/2002 were The Pacific Islands, Africa, Central/South America, North America and Australia (Anon. 2003i), based on the occurrence of unwanted species and organisms inhabiting these points of origin and the frequency of past detection at border inspections. For example, 65% of invasive ants are associated with sea containers that originate from the Pacific Islands (Nendick and Sarty 2006).

The countries that New Zealand exports to must also protect their borders from species that are established in New Zealand (either native or introduced) for example

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<sup>46</sup> <http://www.nps.gov/plants/ALIEN/fact/romu1.htm>

<sup>47</sup> [http://na.fs.fed.us/spfo/pubs/howtos/ht\\_wpblister/toc.htm](http://na.fs.fed.us/spfo/pubs/howtos/ht_wpblister/toc.htm)



the export of unprocessed timber from New Zealand to the USA (Prestemon 2008) and New Zealand grown apples exported to Australia (Anon. 2003f).

As a biosecurity risk, it is of interest to note that a total of 13,595 containers entered New Zealand from 'unknown origins' in the first half of 2004, with these containers arriving at all six of New Zealand's sea ports. Information as to the contents of these containers was not available nor was the reason for the import information discrepancies.

# Chapter 4

## International Trade Agreements and Administrative Bodies

*“Biosecurity is of growing interest as a result of major international developments including globalisation of the world economy, the rapid increase in communications, transport and trade, technological progress, and increased awareness of biological diversity and environmental issues.” (FAO committee on agriculture)*

### 4.1 Introduction

Given that the movement of any vessel, cargo or human poses a significant biosecurity risk, it is essential for biosecurity measures and activities to be regulated by international agreements and organisations to maintain fair trade. There are numerous international trade agreements that regulate all aspect of international trade, although not all agreements are ratified and are therefore not legally binding. This chapter provides a summary of the international organisations and their relevant agreements that have implications for New Zealand’s biosecurity management; this includes outlining general aspects of international trade agreements and their respective administrative bodies, as well as describing the multilateral and bilateral trade agreements in more detail. These descriptions afford an overview of the international trade environment within which New Zealand must manage to facilitate trade while protecting its environmental and economic health through biosecurity management.

Members of international organisations such as the World Trade Organisation (WTO), the Food and Agriculture Organisation (FAO), the World Health Organisation (WHO), and the Office International des Epizooties (OIE) require both national and international frameworks and standards that support and regulate each other and manage and control all aspects of trade, including biosecurity. Member countries are

required to participate within the limits of their respective resources in relevant international organisations and agreements, particularly the Codex Alimentarius Commission (Codex), the WTO Sanitary and Phytosanitary Agreement (SPS) and the FAO International Plant Protection Convention (IPPC). Member countries are also expected to accept measures in place by other member countries, provided that they are based on international measures or scientific research. To further harmonise international trade, members may be requested to consult on measures with the aim of achieving bilateral and multilateral agreements. Member nations are to notify the relevant international organisations of any changes and provide any information on their measures to member countries.

As a member of the WTO and FAO, New Zealand has the sovereign right to decide its own level of protection while insuring our exports meet the level of protection required by the importing country. New Zealand's domestic legislation complements the SPS and IPPC agreements, as it embodies and promotes the use of the science-based risk assessment that New Zealand has adopted in managing the risks associated with the international movement of goods and people (Anon. 2003i).

The International Maritime Organisation (IMO) is another important organisation in terms of international trade safety, by ensuring cargo is shipped cost effectively, cleanly and safely through shipping and sea container standards<sup>48</sup>. The IMO was established in 1958 and is a specialised agency of the UN, with 167 member states. IMO standards include maritime biosecurity management, for example, standards on Ballast water exchange. Although the IMO's standards are an important aspect of shipping and container safety they have limited influence on New Zealand's biosecurity management per se.

## **4.2 Multi-lateral Trade Agreements**

New Zealand is a member of several international organisations and is party to the multilateral agreements that these organisations administer; including the WTO and

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<sup>48</sup> <http://www.imo.org/> 01-01-07

FAO. These agreements that influence how New Zealand manages its Biosecurity and the organisations that administer them are described below.

#### **4.2.1 The World Trade Organisation (WTO)**

Currently at the centre of international trade is the World Trade Organisation (WTO). The WTO and its agreements were created by the Uruguay Round Negotiations (1986-94) and put into force in January 1995. The WTO has 147 members (April 2004)<sup>49</sup>, who represent the vast majority of the world's trading nations. The WTO is essentially a forum in which governments can hold trade negotiations<sup>50</sup> and succeeded the General Agreement on Tariffs and Trade 1947 (GATT 1947) as an international organisation. However, the General Agreement still exists as the WTO's over arching agreement for the trade in goods, but was updated as a result of the Uruguay Round negotiations.

The WTO is governed by the representatives of its member nations' governments. All major decisions are reached through consensus by the membership as a whole. Decisions are made through various councils and committees, which consist of representatives of all WTO members. The highest council within the WTO is the Ministerial Conference (held every two years), which consists of the ministers of all member nations. In between the Ministerial Conferences the day-to-day operations of the WTO are conducted by three bodies, the General Council, the Disputes Settlement Body and the Trade Policy Review Body. However, the agreement establishing the WTO states that all three bodies are in fact the General Council, although they meet under different terms of reference. The General Council acts on behalf of the Ministerial Conference on all WTO matters and meets as the Dispute Settlement Body and the Trade policy Review Body to oversee procedures for settling disputes between members and to analyse members' trade policy. The next level of councils consists of another three councils: the Council for Trade in goods (Goods Council), the Council for Trade in Services (Service Council) and the Council for Trade-related Aspects of Intellectual Property Rights (TRIPPS Council). All report to the General

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<sup>49</sup> [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/org6\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm)

<sup>50</sup> (WTO 2003) page 8

Council. They have subsidiary committees, which deal with all the different aspects of each council. There are also further six bodies, which report to the General Council, but since their scopes are smaller they are considered committees.

### **General Agreement on Tariffs and Trade (GATT)**

GATT 1994 is the general trade agreement of the WTO and sets out international guidelines and rules for trade and tariffs but does not specifically refer to any guidelines for biosecurity measures. Since 1994 there have been two GATT agreements, the first and original agreement is known as GATT 1947 and the second as GATT 1994. GATT 1994 is legally distinct from GATT 1947<sup>51</sup> in that it lays down the main rules specific for the trade of goods between the WTO members. Unlike GATT 1947, GATT 1994's scope and coverage has been fully specified, detailed and is one of the Multilateral Trade Agreements attached to the WTO Agreement, accepted by participating governments and ratified by national parliaments, giving GATT 1994 a firm legal basis.

GATT 1994 consists of four parts. The content of each Part and its Articles is briefly given below.

Part 1 consists of two Articles. Article I, the 'Most Favoured Nation Clause', sets out the concept of non-discrimination. Article II states the obligations associated with the Schedules of Concessions of each WTO Member.

Part II covers Articles III through XXIII of the General Agreement. Article III deals with the concept of National Treatment. Articles XIV to XIX cover a wide variety of subjects, which can all broadly be regarded as non-tariff measures. Provisions in this group concern unfair trade practises such as dumping and export subsidies, quantitative restrictions, restrictions for balance-of-payments reasons (and related cooperation with the International Money Fund), state-trading enterprises, government

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<sup>51</sup> The Marrakesh Agreement Establishing the WTO states that the GATT 1947 is legally distinct from GATT 1994 annexed to the Final Act of the United Nations Conference on Trade and Employment (Havana Conference), and referred to as GATT 1947

assistance to economic development and emergency safeguard measures (screen quotas for cinema films, freedom of transit, customs valuation, fees and formalities, mark of origin and transparency of trade regulations). General and national security exceptions are provided for in Articles XX and XXI, respectively. Provisions on consultations and dispute settlements in Articles XXII and XXIII are elaborated in the WTO dispute settlement rules.

Part III comprises Articles XXIV through XXXV. Article XXIV deals with customs unions and free trade areas, as well as with territorial application, frontier traffic, and the responsibility of members for actions by their regional and local governments. Article XXVIII covers the negotiations and renegotiations of Tariffs. Article XXIX outlines the relationships between GATT 1994 and the Havana Charter. Article XXXIV makes the annexes an integral part of the 1994 Agreement.

Part IV of the agreement deals with Trade and Development in Articles XXXVI and XXXVII, providing rules and benefits for developing countries. Article XXXVI deals with the Principles and Objectives on Trade and development in the GATT 1947 agreement. Article XXXVII outlines the three main commitments of developing country members.

### **Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement 1995)**

The WTO members negotiated the agreement on the Application of Sanitary and Phytosanitary Measures (which came into force January 1995) in order to achieve a balance between members' rights to protect their biological resources from risks and their freedom of trade. The SPS Agreement established principles that members are committed to uphold when trading in animals, plants and their products internationally while at the same time facilitating trade. This agreement therefore applies to all sanitary and phytosanitary measures, which may, directly or indirectly, affect international trade. This agreement works in conjunction with other international trade agreements including the Codex Alimentarius 1961 (Codex), General Agreement on Tariffs and Trade 1994 (GATT), International Plant Protection Convention 1952 (IPPC) and Technical Barriers to Trade 1973-79 (TBT). The SPS

agreement also protects members from discrimination by ensuring that trade restrictions imposed by members are no-discriminatory, transparent and scientifically justified<sup>52</sup>.

The SPS Agreement (1995) allows member countries to develop their own import health standards, providing they are based on science. However, member countries are encouraged to use international standards, guidelines and recommendations, where they exist and are applicable, to allow for the increase in harmonization of international trade. All standards should only be applied, if they are necessary to protect human, animal and plant health, and *only to the extent required*. Standards should not be arbitrary or unjustifiably discriminate between countries where similar conditions prevail.

The SPS Agreement comprises of 14 Articles, whose content will be given here in brief.

Articles 1 and 2 specify the General Provisions and Basic Rights and Obligations (respectively) of the members. Article 3 refers to the need of *harmonization* of sanitary and phytosanitary measures where possible, although Paragraph 3 allows members to introduce and maintain measures that are more stringent than international standards, if there is scientific justification or if they are in accordance with Article 5 Paragraphs 1 through 8. Article 4 addresses equivalence by outlining how member nations are expected to accept the measures of other member nations as equivalent. Article 5 refers to the ‘Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phytosanitary Protection’ by setting up guidelines for the risk assessment and the development of appropriate measures for achieving compliance in accordance with international standards and scientific evidence. Article 6 addresses Adaptation to Regional Conditions, including Pest-or disease-free Areas and Areas of low Pest or Disease Prevalence. This is to ensure that members establish measures adapted to the characteristics of any given area (at any scale) from which the trade product originated. Article 7 refers to the Transparency of any measures or changes in measures. Members are expected to provide information on

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<sup>52</sup> (WTO 2003)

their measures in accordance with Annex B. Article 8 addresses Control, Inspection and Approval procedures. Members are expected to observe the provisions of Annex C when operating control, inspection and approval procedures. Article 9 provides provisions for Technical Assistance amongst members especially for developing country members. Article 10 refers to Special and Differential Treatment. Members are expected to take into account the special needs of developing country members, in particular the least developed country members. Article 11 refers Consultations and Dispute Settlement, where Articles XXII and XXIII of the GATT 1994 apply to this agreement. Articles 12, 13 and 14 provide for this agreement's Administration, Implementation and Final Provisions respectively.

#### **4.2.2 The Food and Agriculture Organisation (FAO)**

The FAO was established in 1943 when forty-four governments committed themselves to funding a permanent organisation for food and agriculture. During the organisation's inaugural session in 1945, the FAO was established as a specialised agency of the United Nations. The FAO is governed by the Conference of Member Nations, which meet every two years. The Conference elects both a council of 49 Member Nations to act as an interim governing body, which serves in three-year rotating terms and the Director-General, who serves a six-year term. The FAO comprises of eight departments: Administration and Finance, Agriculture, Economic and Social, Fisheries, Forestry, General Affairs and Information, Sustainable development and Technical Cooperation.

Similar to the WTO, the FAO is a neutral forum in which all member nations meet to negotiate agreements and policies (both domestic and international) relating to food and agriculture. Article XIV of the FAO constitution allows the conference to improve and submit conventions and agreements between member nations that concern food and agriculture<sup>53</sup>. The conference has passed many agreements, standards and conventions, which are legally binding for all member nations. The International Plant Protection Convention (IPPC) (detailed below) is the FAO agreement establishing international standards and guidelines for plant protection and

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<sup>53</sup> <http://www.fao.org/Legal/treaties/treaty-e.htm>



the prevention, control, and where possible, the eradication of plant pests and diseases. Another important function of the FAO is working in helping developing countries and countries in transition to modernise and improve their agriculture, forestry and fisheries practises and to ensure good nutrition for all.<sup>54</sup>

The FAO's mandate is “...to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribution to the growth of the world economy.”

### **International standards for Phytosanitary measures the International Plant Protection Convention (IPPC)**

The International Plant Protection Convention (IPPC) is a multilateral treaty adopted by FAO in 1951 and came into force 1952. The IPPC currently has 122 participants, with five levels of commitment; signature (36 members), ratification (34 members), adherence (85 members), definitive signature (1 member) and succession (1 member). Although the Convention is limited to cultivated plants, protection is not limited to direct damage from pests. Thus, the scope of the Convention extends to the protection of both cultivated and natural flora from both direct and indirect damage by pests.

The purpose of the Convention is “... international cooperation in controlling pests of plants and plant products and in preventing their international spread, and especially their interdiction into endangered areas.”

The convention has been amended twice, once in 1973 and again in 1997. The most recent revision was made to reflect the role of the IPPC in relation to the GATT Uruguay Round Agreements, particularly the SPS Agreement. The SPS Agreement names the IPPC as the organisation providing international standards to help ensure that measures implemented by governments to protect plant health (phytosanitary measures) are harmonised and not used as unjustified barriers to trade. While the SPS and IPPC agreements are distinct in their scope, purpose and membership, they are

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<sup>54</sup> [http://www.fao.org/UNFAO/about/index\\_en.html](http://www.fao.org/UNFAO/about/index_en.html)

complementary in areas of overlap i.e. the SPS Agreement makes provisions for plant protection in a trade agreement and the IPPC makes provisions for trade in a plant protection agreement; thereby, neither agreement supplements the other.

The IPPC comprises of 23 Articles. Articles I through to III provide the purpose and responsibility, the use of terms and the relationship with other international agreements. Article IV encompasses general provisions relating to the organisational arrangements for national plant protection. Article V refers to phytosanitary certification, while Article VI deals with the measures to regulate pests. Article VII gives members the sovereign right to regulate the entry of plant and plant products and other regulated articles in accordance with applicable international agreements. However, under Paragraph 2 of Article VIII members are contracted to minimize the interference on trade of any regulations established under Paragraph 1. Article VIII ensures that members cooperate with one another to the fullest practicable extent in order to achieve the aims of this convention. Article IX deals with the establishment and function of regional plant protection organisations. Article X refers to the development of standards, outlining that regional standards should be consistent with the principles of the convention. Article XI establishes the Commission on Phytosanitary Measures within the framework of the FAO, with Article XII outlining the appointment and function of the Commission's Secretariat. Article XIII provides the guidelines for the settlement of disputes. Articles XIV through XVI refer to the development of agreements; including the substitution of prior agreements, territorial agreements and supplementary agreements. Article XVII provides the legal basis of the convention through the ratification and adherence of the convention by members. Article XVIII encourages members of the FAO who are not party to the IPPC convention to accept the convention and any non-contracting party to the IPPC to adhere to the conventions principles and international standards. Articles XIX through XXIV refer to Languages, Technical Assistance, Amendments, Entry into Force and Denunciation respectively.

As well as being an active observer in the SPS Committee, the IPPC routinely interacts with other standard setting organisations, especially the Codex Alimentarius for food safety (Codex) and the Office International des Epizooties (OIE) for animal

health. The IPPC, the Codex, and the OIE have a close relationship under the SPS Agreement.

#### **4.2.3 Codex Alimentarius Commission**

The Codex Alimentarius Commission was officially established in 1963 by the FAO and World Health Organisation (WHO). The commission was charged with developing food standards, guidelines, and related texts to protect the health of consumers and to ensure the fair trade of food commodities; with the FAO and the WHO passing resolutions to adopt the Statutes and Rules of Procedure set by the Commission. The Statutes provide the commission's legal basis, and the Rules of Procedure formalise its working procedures of the commission. The commission is an international body with membership open to all of the FAO's and WHO's Member and Associated Member Nations. The commission meets twice yearly in what is known as Plenary Sessions which are chaired by a chairperson from one of the eleven contracting nations and a vice-chairperson drawn from a pool 22 member countries. . The sessions are attended by up to 500 people, which are either representatives or delegates of each member nation, i.e. senior officials appointed by their governments, which can include non-governmental representatives.

#### **Codex**

Since its establishment in 1963, the Codex has become the single most important international reference point for the developments associated with food standards. The Codex comprises of the following standards and guidelines:

- Food standards for commodities (237)
- Codes of hygienic or technological practice (41)
- Pesticides evaluated (185)
- Limits for pesticide residues (3274)
- Guidelines for contaminants (25)
- Food additives evaluated (1005)
- Veterinary drugs evaluated (54)

#### **4.2.4 Office International des Epizooties (OIE)**

The negotiations for the international agreement to create the Office International des Epizooties (OIE), sanctioned by the League of Nations, were concluded on 25 January 1924. The agreement was ratified by 24 of the 28 negotiating countries by 1927, and the first session of the committee was held on 28 March 1927. The OIE is an international governmental organisation and has 166 member countries (as of March 2004). It provides international standards on animal disease and zoonosis situations. The highest authority in the in OIE is the International Committee, which comprises of all the delegates and meets at least once a year. The committee elects the governing bodies of the OIE (President, Vice-president, President Committee, Members of the Administration Commission, Regional and Specialist Commissions) and appoints the Director General of the OIE. The next lower level within the organisation is the Administrative Committee and below that, both, the Specialist and Regional Committees report to the Administrative Committee.

#### **International Animal and Aquatic Animal Health codes**

The International Animal Health Code and the International Aquatic Animal Health Code were established by the Office International des Epizooties and are referred to in respective sections of the SPS Agreement that apply to animal health. The purpose of these two codes is essentially the same; they both aim to ensure the sanitary safety of international trade in animals and animal products (all mammals, birds, bees and aquatic species) and to avoid the transfer of disease-agents that are pathogenic for animals and/or humans.

The text in both codes being relatively similar, both codes deal with the obligations of the exporting and importing countries with regard to importing and exporting procedures, risk analysis of animals and animal products and the procedures of contamination notification. Each code contains a detailed list of all the diseases associated with the respective animals and animal products, applicable sanitary measures and a list of commodities, which have been known to transmit the disease.

### 4.3 Bi-lateral trade Agreements or Regional Trade Agreements (RTAs)

Under normal conditions setting up a customs union or a free trade area between two trading nations violates the WTO's principle of equal treatment for all trading partners<sup>55</sup>. However, the WTO, under GATT (1995) Article 24, Paragraphs 4-10, the Enabling Clause, and Article 5 of General Agreement on Trade in Services (2000) (GATS 2000), permits Regional Trade Agreements (RTAs) and Closer Economic Integrations (ECIs), provided that these agreements meet the strict criteria set out in GATT/GATS<sup>56</sup>. The WTO recognises that, although such arrangements may benefit the member states involved, under certain circumstances they have the potential of negatively impacting on the trade interests of those member states not party to the agreements. Despite the potential negative impact, the WTO sanctions RTAs, as they permit member states to negotiate rules and commitments that exceed what was possible at the time multilaterally<sup>57</sup>. Some of the rules within these RTAs or ECIs have also been utilised in the development of agreements within the WTO<sup>58</sup>.

There has been a steep increase in the number of RTAs since the early 1990s; with the majority of WTO members being signatories to one or more RTAs (Figure 4.1.). There were 250 RTAs notified to the GATT/WTO by December 2002, of which 130 were notified after 1995. Over 170 RTAs are currently in force and an additional 70 are operational, although not officially notified with the WTO. It is estimated that there will be approximately 300 RTAs in force by 2005, if the RTAs currently planned or under negotiation are concluded<sup>59</sup>.

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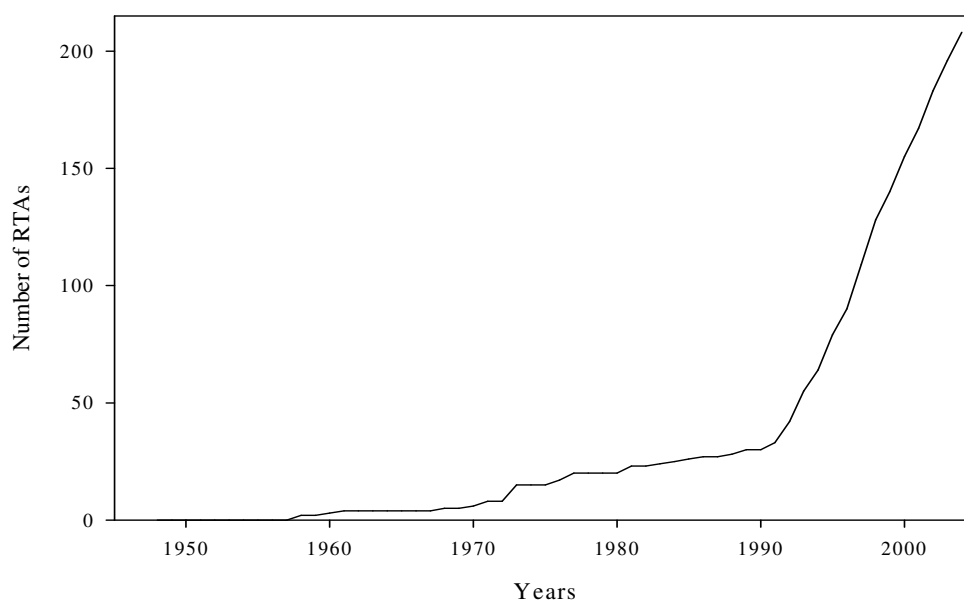
<sup>55</sup> [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/bey1\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/bey1_e.htm) 01-01-2007

<sup>56</sup> [http://www.wto.org/english/tratop\\_e/region\\_e/regrul\\_e.htm](http://www.wto.org/english/tratop_e/region_e/regrul_e.htm) 01-01-2007

<sup>57</sup> [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/bey1\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/bey1_e.htm) 01-01-2007

<sup>58</sup> [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/bey1\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/bey1_e.htm) 01-01-2007

<sup>59</sup> [http://www.wto.org/english/tratop\\_e/region\\_e/region\\_e.htm](http://www.wto.org/english/tratop_e/region_e/region_e.htm) 01-01-2007



**Figure 4.1.** The number of Regional Trade Agreements by date of entry into force. Data sourced from the WTO.

The WTO's General Council established the Committee on Regional Trade Agreements (CRTA) in 1996 with the principal duties of examining individual regional agreements and to investigate the systematic implications regional trade agreements may have for the multilateral trading system and the relationship between them<sup>60</sup>. The CRTA also has the mandate to develop procedures to facilitate and improve the examination process and to ensure that the reporting on the operation of the regional agreements is adequately carried out by the parties to the agreements. The GATT/WTO rules state that regional trade agreements have to meet certain criteria, the interpretation of their wording, however, has become controversial and is the central work of the CRTA<sup>61</sup>.

The RTAs that New Zealand is party to are referred to as Closer Economic Partnership Agreements (CEPs), also known as preferential or free trade agreements. Generally CEPs involve the removal of tariffs on goods, the liberalisation of services trade and provisions to encourage investment within the free trade area. As trade flow is also affected by domestic administration and regulations in the form of tariffs and

<sup>60</sup> [http://www.wto.org/english/tratop\\_e/region\\_e/regcom\\_e.htm](http://www.wto.org/english/tratop_e/region_e/regcom_e.htm) 01-01-2007

<sup>61</sup> [http://www.wto.org/english/tratop\\_e/region\\_e/regrul\\_e.htm](http://www.wto.org/english/tratop_e/region_e/regrul_e.htm) 01-01-2007

quotas, CEPs provide means of facilitating trade through cooperation and development of standards, conformance and customs procedures. Thus, well developed and instigated CEPs need to be comprehensive and consistent with WTO provisions, Asia Pacific Economic Community (APEC) goals and principles as well as open to other economies<sup>62</sup>.

#### **4.3.1 Australia New Zealand Closer Economic Relations Trade Agreement (CER)**

New Zealand's first CEP is the treaty with Australia, which came into force on 1 January 1983. The CER succeeded the existing agreement, the New Zealand Australia Free Trade Agreement (NAFTA), which had been in force since 1 January 1966. The objectives of the 1983 Agreement are<sup>63</sup>:

- *“to Strengthen the broader relations between Australia and New Zealand;*
- *to develop closer economic relations between the Member states through a mutually beneficial expansion of free trade between New Zealand and Australia;*
- *to eliminate barriers to trade between Australia and New Zealand in a gradual and progressive manner under an agreed timetable and with a minimum of disruption and;*
- *to develop trade between New Zealand and Australia under conditions of fair competition”.*

The agreement consists of 26 Articles covering all aspects of trade relations between New Zealand and Australia. Article 1 outlines the Objectives of the Agreement. The Free Trade Area, Rules of Origin, Tariffs are addressed in Articles 2 through 4. Article 5 refers to the Quantitative Import Restrictions and Tariff Quotas. The Modified Applications of this Agreement are dealt with in Article 6. Article 7 outlines Revenue Duties. Articles 8 and 9 cover Quantitative Export Restrictions and Export Subsidies and Incentives respectively. Agriculture Stabilisation and Support is covered in Article 10, while Government Purchasing is covered in Article 11.

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<sup>62</sup> <http://www.mfat.govt.nz/foreign/tnd/ceps/ceptext.html>

<sup>63</sup> [http://www.dfat.gov.au/geo/new\\_zealand/anz\\_cer/anzcerta1.pdf](http://www.dfat.gov.au/geo/new_zealand/anz_cer/anzcerta1.pdf)

Articles 12 through 14 refer to Other Trade Distorting Factors, Rationalisation of Industry and Intermediate Goods. Article 15 addresses Anti-dumping Actions and Article 16 Countervailing Action. Safeguard Measures during the Transition Period are dealt with in Article 17. Article 18 outlines the Exceptions for the Agreement. The Termination of earlier Agreements and Transitional Measures relating to earlier Agreements are outlined in Articles 19 and 20. Article 21 refers to the Harmonisation of Customs between the two contracting parties. Articles 22 through 24 refer to Consultation and Review, Territorial Application, and Association with the Agreement respectively. Article 25 outlines the Status of the Annexes associated with the Agreement. Article 16 deals with the Agreements Entry into Force.

#### **4.3.2 Agreement between New Zealand and Singapore on a Closer Economic Partnership**

New Zealand's second bilateral CEP is its Agreement with Singapore, the Agreement between New Zealand and Singapore on a Closer Economic Partnership (ANZSCEP). This agreement was entered into force on 1 January 2001, and its aim is to further enhance the pre-existing bilateral agreement between the two contracting parties, covering the trade in both goods and services. This agreement was designed to promote the economic growth of the contracting parties whilst also promoting greater international and regional trade liberalisation.

The agreement consists of four Parts. Part 1 outlines the agreement's Objectives and General Definitions in Articles 1 and 2. Part 2 addresses Competition in Article 3. Part 3 refers to Trade in Goods. Articles 4 through 9 deal with Tariffs, Rules of Origin, Non-Tariff Measures, Subsidies, Safeguard Measures, and Anti-dumping respectively. Part 4 refers to custom procedures required for clearance of goods traded. Articles 10 and 11 allow customs procedures to be in accordance with the contracting parties' national laws, rules and regulations, although they are encouraged where possible to conform to international standards. Article 12 refers the implication of the APEC Blueprint for Action on Electronic Commerce. Article 13 addresses risk management and the limits on total custom transactions.



### **4.3.3 New Zealand and the People's Republic of China Free Trade Agreement**

The agreement between New Zealand and the People's Republic of China, signed in May 2004, sets out the guidelines and the timeframe for the negotiations for the actual trade agreement. This agreement formalises the commitment that both Governments have made to further develop trade and investment.

The agreement consists of 12 paragraphs and 2 annexes. Paragraphs 1 through 3 outline the agreements objectives and scope. Paragraphs 4 and 5 establish the Joint Ministerial Commission, which is jointly chaired, to further enhance communication on all relevant aspects. Paragraph 6 addresses the need for further facilitation of mutual business travel and linkages between all relevant associations of the member nations. Paragraphs 7 through 9 facilitate consultations at both bilateral and multilateral levels. Paragraphs 10 through 12 outline the framework for the negotiation process.

### **Trans -Pacific Strategic Economic Partnership Agreement (TPSEPA or P4) among Brunei Darussalam, Chile, New Zealand and Singapore**

On 3 June 2005 Brunei, Chile, New Zealand and Singapore successfully negotiated the Trans-Pacific Strategic Economic Partnership Agreement (TPSEPA or P4). This agreement included a successful end to negotiations on a binding Environment Cooperation Agreement and a binding Labour Cooperation Memorandum of Understanding. The agreements were ratified in April 2005 and officially came into force on 28 May 2006.

This agreement consists of 20 Chapters and 4 Annexes and aims to further liberalise trade and investment by establishing clear rules governing their trade, build on their rights, obligations and undertakings under the WTO; while preserving the rights of each of the four governments to regulate in order to meet national policy objectives and to safeguard public welfare. Chapters 1 and 2 outline the general scope, definitions and the establishment of the free trade area. Chapter 3 provides the

definitions, scope and other provisions for the trade of goods. The rules of Origin and Customs Procedures are outlined in Chapters 4 and 5 respectively. Chapters 6 through 9 outline each government's obligations under WTO and other international agreements such as SPS measures and Technical Barriers to Trade (TBT). Intellectual property, government procurement and trade in services are provided for under Chapter 10 through 12. The transparency rules, dispute settlement and strategic partnership are outlined in Chapter 14 through 16. Chapters 17 through 20 provide the administrative and institutional provisions, general provisions, general exceptions and final provisions. The Annexes to the agreement outline tariff schedules, specific rules of origin and Service schedule.

#### **4.3.4 CEP under negotiation**

Currently New Zealand is in the process of negotiating a further five CEPs with countries or established trading blocks and associations: Hong Kong, Mexico, and Malaysia. A brief description is given below:

##### **Hong Kong/New Zealand CEP**

In April 2001, New Zealand and Hong Kong announced intentions to negotiate a CEP; since then five rounds of negotiations have taken place. The negotiations have reached their final stages with agreements on most matters. Some outstanding issues relate to services and the rules of origin that determine whether or not imports qualify for duty free entry.

##### **Mexico**

New Zealand and Mexico announced intentions of conducting studies into the possibility of a bilateral CEP in October 2002. Although progress has been made on the studies, there have been no formal commitments to further the process.

## **Malaysia**

On 31 March 2005 New Zealand and Malaysia announced that they had agreed to negotiate a Free Trade Agreement (FTA). Although progress has been made during the sixth round of negotiations there is still no formal agreement.

## **AFTA/CEP**

New Zealand is currently in the process of discussing the possibility of a trade agreement with Australia and the ten members of the Association of South East Asian Nations (ASEAN). The intentions are for these discussions to further the trade already existing between these nations and to enhance trade liberalisation within the region.

### **4.4 Synopsis**

Given that the trade of any commodity poses or increases the risk to any trading nation's biosecurity, international trade agreements and international trade policies have direct and indirect implications on a nation's trade and biosecurity legislation and measures. Being at the centre of international trade, the WTO and its agreements, although not always directly nevertheless strongly influence all aspects of trade including its associated biosecurity risks. The WTO/GATT (1995) agreement essentially aims to establish an international free trade environment effectively increasing cross border trade and activities and thus the potential of biosecurity risks. Articles XX and XXI (General and National Security Exceptions, respectively) and XXIV (Customs Unions and Free Trade Areas) are the Articles within GATT, which have the most relevance for the development of domestic biosecurity legislation.

The WTO/SPS Agreement (1995) was established in order to achieve a balance between protection of biological resources from risks on one hand and freedom of trade on the other; and therefore it directly influences the development of domestic biosecurity legislation. The WTO/SPS Agreement (1995) enables member countries to develop their own import health standards. However, member countries are encouraged to use international standards, guidelines and recommendations, where they exist and are applicable. Articles 3 (Harmonization of Sanitary and

Phytosanitary Measures), especially Paragraph 3 (allows members to introduce and maintain measures that are higher than international standards), and Article 5 (Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phytosanitary Protection) have the most relevance for the development of domestic guidelines for risk assessment and appropriate measures.

The FAO/IPPC (1997) is at the centre of international agreements and policies relating to food and agriculture, with the scope of the Convention being the protection of both cultivated and natural flora including both direct and indirect damage by pests. However, Article VII (Requirements in Relation to Imports), Article IX (Regional Plant Protection Organisations) and Article XV (Territorial Application) are the Articles through which this agreement has the most relevance to the development and implications of domestic biosecurity legislation and protection measures.

The Codex and the OIE are responsible for the development of international standards for food and animal diseases, respectively. These organisations require the notification and regulation (according to international standards) of trading country's procedures for risk analysis and contamination notification. Although these organisations develop international standards, which are legally binding, they have no direct control in the development of domestic border control legislation and measures. However, as their standards are aimed at lowering the risks of contamination of commodities traded, they indirectly influence the biosecurity risk associated with traded commodities.

As with the WTO/GATT (1995) agreement, the CEPs that New Zealand is party to have generally an indirect influence on New Zealand's Biosecurity legislation and measures. For example, New Zealand's CEP with Singapore only indirectly refers to biosecurity measures in its Articles 10 and 11 allowing customs procedures to be in accordance with the contracting parties' national laws, rules and regulations, but encourages domestic standards to conform with international standards, where possible. Similarly, New Zealand's CEP with Australia only indirectly refers to customs procedures:

1. Article 18 outlines the exceptions to the agreement whereby “...*provided that such measures are not used as a means of arbitrary or unjustified*

*discrimination or as a disguised restriction on trade in the area, nothing in this agreement shall preclude the adoption by either Member State of measures necessary:*

- *to protect its essential security interests;*
- *to protect human, animal or plant life or health, including the protection of indigenous or endangered animal or plant life;*
- *to protect intellectual property rights or to prevent unfair, deceptive, or misleading practises;*
- *to protect national treasures.*

2. Article 21...“ *Member states recognise that the objectives of this agreement may be promoted by the harmonisation of customs policies and procedures in particular cases. Accordingly the member states shall consult at the written request of either to determine any harmonisation which may be appropriate*”.

In New Zealand biosecurity is defined by the Biosecurity Strategy Development Team, as “...*the protection of New Zealand’s economy, environment and people’s health from the risks posed by pests and diseases*” (Anon. 2001c). Therefore all international trade agreements or international trade policies, which are related to any aspect of import or export health measures or regulations, have possible implications for New Zealand’s biosecurity management system.

# **Chapter 5**

## **Domestic Legislation and Administrative Bodies**

### **5.1 Introduction**

To coincide with the international trade agreements that New Zealand is party to (see Chapter 4); New Zealand's domestic legislation is designed to further protect New Zealand from the biosecurity risks associated with the international movement of commodities and people. This is achieved through a series of separate pieces of legislation managed by five major government agencies. This chapter provides a summary of the three key pieces of legislation, which manage New Zealand's biosecurity risks at the border level and the government agencies that administer them.

### **5.2 New Zealand's Biosecurity Legislation**

There are a total of 44 separate pieces of legislation (both public and private Acts), which combined regulate New Zealand's biosecurity and border management. However, the majority of the management is covered by three Acts, namely the Biosecurity Act 1993 (BSA 1993), the Hazardous Substances and New Organisms Act 1996 (HSNO 1996) and the Customs and Excise Act 1996. The contents of these three Acts are summarised below.

#### **5.2.1 Biosecurity Act 1993 (BSA 1993)**

The Biosecurity Act 1993 enables the New Zealand Government to manage and minimise the risks associated with the international movement of commodities and people and internal management of pre-existing pests through exclusion, eradication

or control of unwanted organisms. The Act came into effect on 26 August 1993 with the intent to:

*“...restate and reform the law relating to the exclusion, eradication and effective management of pests and unwanted organisms”.*

The BSA 1993 comprises of 10 parts:

### **Part 1 - Preliminary**

This opening part defines the terms used throughout the Act (Section 2) and provides the application for measures on the effects of uncertain origin (Section 3). The BSA's (1993) relationships with other enactments are outlined in Section 7 to ensure that the BSA's (1993) functions, duties and powers affecting or derogating other legislation provisions or vice versa. Section 7a, however, provides the means to create regulations that contravene Part III of the Resource Management Act (1991), meaning biosecurity measures may be in direct conflict with the Resource Management Act (1991) restrictions.

### **Part 2 - Functions, Powers and Duties**

This part regulates the functions of offices their powers and their duties.

#### **Ministers**

Section 8 outlines the duties of the responsible Minister (currently the Minister Agriculture and Forestry); which include providing for the implementation of this Act, recording and co-ordinating reports of suspected new organisms and managing appropriate responses to such reports. Section 9 specifies the powers of the Minister with regard to the function of the Act and the development of regulations. It defines to whom the Minister is responsible and identifies the responsibilities, which the Minister is not permitted to delegate. Under section 11 any government Minister has the responsibility and the power to take actions in relation to biosecurity emergencies. Section 12 allows the responsible Minister to acquire any information relevant to any function, power or duty under this Act or under any pest management strategy.

### **Local Authorities**

Sections 13 through 15 clarify the powers of regional authorities to fulfil their biosecurity responsibilities within their region. This includes the monitoring, gathering of information on pest agents and unwanted organisms within their region and the management of all pests through pest management strategies. Section 15 outlines the conditions under which a local authority may transfer powers for pest management to another local authority.

### **Part 3 – Importation of Risk Goods**

This part is specifically for the importation of risk goods, with the purpose of “...providing for the effective management of risk associated with the importation of risk goods”. Risk goods are defined under Section 2 of the BSA (1993) as any organisms, organic materials or other things and substances that (by reason of their nature, origin, or other relevant factors) are reasonable to suspect constituting, harbouring or containing an organism that may:

- *Cause unwanted harm to natural and physical resources or human health in New Zealand; or*
- *Interfere with the diagnosis, management, or treatment, in New Zealand, of pests and unwanted organisms.*

### **Arrival of Craft**

Sections 17 through 19 outline the protocols and procedure for the arrival of any craft into New Zealand territories. Prior to arrival, approximate arrival time and destination notification is required. Failing that, authorities must be notified immediately upon arrival, and any risk goods are prohibited from being removed until clearance is given. Section 19 allows for the inspection of any person and their baggage upon disembarking from the craft in New Zealand.

### **Import Health Standards**

Section 22 outlines the issuing and use of Import Health Standards (IHS). IHS are standards that specify the required condition and treatment of commodities prior and upon arrival in New Zealand.



### **Clearance of Risk Goods**

The procedures associated with the transport, inspection, unloading and possible seizure of uncleared goods are outlined under Sections 25 through 29 of the BSA 1993. All goods imported into New Zealand must be given a biosecurity clearance by an inspector (a Customs authorised person), who must be satisfied that the goods are either not risk goods or, if they are, that they comply with the requirements specified by the IHS and are accompanied by appropriate documentation. If the risk good is an organism, the inspector must be satisfied that it does not display any signs or symptoms of harbouring unwanted organisms. Restrictions on issuing clearances may occur, if the risk goods are a new organism<sup>64</sup>, a prohibited organism<sup>65</sup> or an organism that is intended for a containment facility.

### **Inspection and Declaration**

Sections 30 through 41 outline the inspection and declaration of imported goods and facilities required for the clearance of risk goods and persons arriving in New Zealand. These sections legislate for the inspection of uncleared goods, both accompanied and unaccompanied, the boarding of crafts, the procedures to deal with risk goods on a craft, the disembarkation of risk goods or persons of a craft. The duties relating to the people in biosecurity areas are also outlined, as is the movement of risk goods at a port approved as the place of first arrival and arrival at a port not approved as a place of first arrival. Sections 39 through 41 legislate the approval of transitional facilities and containment areas, the approval of facility operators and the designation of quarantine areas.

### **Part 4 – Surveillance and Prevention**

This part provides for the continuous monitoring of New Zealand's status in regard to pests and unwanted organisms:

- *“... to facilitate the provision of assurance and certificates in relation to exports of organisms and their products; and*

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<sup>64</sup> The BSA 1993 is not concerned with the purpose of the legal importation of new organisms; these importations are governed by the Hazardous Substances and New Organisms Act 1996.

<sup>65</sup> As specified in Schedule 2 of HSNO Act 1996

- *As a basis for the proper administration of this Act, including the institution of precautionary actions, emergency and exigency arrangements, and pest management strategies; and*
- *To monitor the effect of pest management strategies; and*
- *Otherwise to enable any of New Zealand's international reporting obligations and trading requirements to be met..."*

Sections 43 through to 53 outline surveillance and prevention. These sections legislate for the duties, which provide the Ministry with information and inform the Ministry of suspicions, develop and improve identification systems and responsibilities of owners of organisms to prevent the spread, sale or exhibit of organisms.

## **Part 5 Pest Management**

*"The purpose of this part of the Act is to provide for the effective management or eradication of pests and unwanted organisms."*

### **National Pest Management Strategies**

Sections 56 through 70 outline the duties of the responsible Minister and the procedures for developing National Pest Management Strategies (NPMS). Any person may propose a NPMS with Section 57 outlining the criteria, which must be met before the Minister may notify a proposal. Despite the request, the Minister is under no obligation to notify a proposal; the criteria for not notifying are given in Section 59. Section 60 outlines the preparation and contents of a proposal for a NPMS. The funding information required is outlined in Section 61. Section 62 outlines the criteria and the process for the public notification of the proposed NPMS, including the process and criteria for public submissions. Should a proposed NPMS be notified, Section 63 allows the Minister to establish a board of inquiry to inquire into and report on every proposal for a NPSM. Under Section 68, should a proposed NPMS be approved, an Order of Council allows the Governor General to make a NPMS on the recommendation of the Minister. Section 69A outlines the content criteria of every NPMS and Section 69B the NPMS rules.

### **Regional Pest Management Strategies**

Sections 71 through 84 outline the process by which Regional Pest Management Strategies (RPMS) are created and the duties of the responsible Regional Councils. There are a number of similarities in the creation process between National and Regional Pest Management Strategies. As with the NPMS, any person can propose an RPMS. The procedures by which the responsible Regional Council consults and notifies or may refuse to notify the proposed RPMS are outlined in Sections 72 through 75. The preparation and contents for RPMS are outlined in Section 76, with funding criteria in Section 77. The notification process is legislated in Section 78. Regional Councils may appoint a hearings commissioner to inquire into and report on the proposed RPMS under Section 79. The hearing process, public submissions and the notification of findings are outlined in Sections 79A through 79F. The contents of the RPMS are specified under Section 80A. Strategy rules and exemption powers are legislated for under Sections 80B through 80D. The implementation of RPMS, powers of delegation and the ability for councils to act jointly are outlined in Sections 81 through 83.

### **National and Regional Pest Management Strategies**

Sections 84 through 89 legislate for the issues that apply to both National and Regional pest management strategies, including the agency that will undertake the management. The agencies are required to prepare the operational plan, annually review and provide public access to the operational plan that implements the strategy. Compensation will be made available to any persons adversely affected by the PMS under Section 86. Section 88 outlines the duration of the PMS as well as the declaration of success, partition and notification of an extension for the strategy and the review of the procedures for the strategy. Section 88A allows for minor changes to the strategy and Section 89 allows for the strategy to apply to more than one pest.

### **Funding of Strategies**

The funding for PMS is covered in Sections 90 through 100A. Funding for strategies may be obtained through the implementation of a levy by the Governor General under Section 90. Section 97 legislates the use of rates to fund RPMS with Section 99B outlining the limitation of expenditure. Section 100 allows the regional councils to

undertake small-scale pest management of unwanted organisms without a pest management strategy provided pest management meets the listed criteria.

## **Part 6 Administrative Provisions**

### **Appointments and delegations**

The Chief Executive, Chief Technical Officer (CTO) and Deputy Chief Technical Officers are appointed by the Director-General, while inspectors, authorised persons and accredited persons are appointed by a chief technical officer under Sections 101 through 105.

### **Administrative powers**

When necessary, the CTO, the inspectors and authorised persons may employ any person or request any person to assist in order to conduct the provisions of this act. Inspectors are also given the power to search areas and crafts, search and detain people and their baggage in order to ascertain the presence of risk goods, and they may seize and dispose of unauthorised goods under Sections 107 through 120. The power of the inspector to inspect organism is given in Section 120, with the powers to test for unwanted organisms, to vaccinate or destroy an organism given in Sections 121B through 124. Under Sections 125 through 129 the CTO or authorised inspectors are given the power to inspect a transitional facility and intervene when necessary and even to destroy organisms contained within the facilities.

### **Place and area controls**

Under Sections 130 through 134 the CTO or inspectors may declare areas restricted or controlled and create road blocks, cordons and check-points for a stipulated period and are given the power to enforce all restrictions and controls.

### **Recovery of costs**

Sections 135 and 136 outline the recovery of costs associated with administering this Act (but not appropriated by Parliament), including the criteria for cost recovery, allocation and collection, along with the penalties for payment failure. Sections 137 through 142 enable the Minister to develop levies including the processes by which

disputes are settled. The processes for auditing levy collection and information storage are also specified.

### **Part 7 Exigency Actions**

*“The purpose of this part of the act is to provide for the efficient prevention, management or eradication of unwanted organisms if emergencies or other exigency occur”*

Sections 143 through 153 define the conditions and rules for a Governor-General to declare a biosecurity emergency, if the criteria set out in Section 144 are met. Section 145 provides the Minister with the powers to undertake measures for the purpose of managing or eradicating the unwanted organism for which the emergency has been declared in the prescribed area(s). The duration of the emergency is 4 months unless revoked or extended by the House of Representatives. The House of Representatives has to be informed of the emergency declaration as soon as possible, the House also has the power to revoke a biosecurity declaration under Section 148.

Under Section 150, the Governor-General has the power to develop regulations for the management or eradication of the organism for which the emergency has been declared, with section 151 outlining the confirmation of the regulations. The Minister may, under Section 152, develop provisional control programmes to prevent the spread of an unwanted organism that is suspected to be in New Zealand.

### **Part 8 Enforcement, Offences and Penalties**

Offences enforceable under this Act are outlined in Section 154; this includes any threats against an official or intentionally hindering an official from conducting her or his duties, as well as other offences such as impersonating an official or undertaking any actions in relation to an unauthorised good that is in direct conflict with any provision of this Act. Persons proven to have committed any offence under Section 154 are liable unless it can be proven that they acted with the permission of an authorised person. Section 157 outlines the penalties associated with any conviction

under Section 154, including fines and imprisonment. Fines are payable to the agency, which is administering or implementing the action under the BSA (1993).

### **Part 9 Miscellaneous Provisions**

Section 162 outlines the circumstances under which compensation is payable and to whom and the criteria for establishing the amount that is to be paid. An official acting in accordance with any provision under this Act is protected under Section 163 removing any liability from the official, unless the action was not conducted in good faith or with reasonable cause. The liability of any person for loss or damage of any goods is outlined in Section 164. Section 165 outlines the different purposes for which the Governor-General can make regulations, while Section 166 outlines the general provisions for the regulations made under Section 165. Sections 167 and 168 outline the repealing, revoking and amendments of enactments respectively.

### **Part 10 Savings and Transitional Provisions**

Sections 169 through 185 cover the Acts, Regulations, Order of Council and Notices that are retained under this legislation. This was done in order to enable a smooth transition between legislation i.e. to keep relevant preceding legislation in place until structures and standards can be formed under the BSA 1993 to replace it.

## **5.2.2 Hazardous Substances and New Organisms Act (HSNO) 1996**

The HSNO Act was passed in June 1996 under the Ministry for the Environment. The Act is in two major parts, one relating to new organisms (came into effect in July 1998) and the other relating to hazardous substances (came into effect July 2001). The Act consists of 15 parts (Part 16 has expired as of 29 July 2001):

### **Part 1 – Preliminary**

This part of the Act defines the terms used throughout the Act and provides the meaning of a ‘new organism’ in Section 2A, as an organism belonging to a “*species that was not present in New Zealand immediately before 29 July 1998.*”

## **Part 2 – Purpose of Act**

Section 4 states the purpose of this Act, which is to:

*“...protect the environment, and health and safety of people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms<sup>66</sup>.”*

Sections 5 through 9 outline the principles and matters relevant to the purpose of the Act and the Treaty of Waitangi. These Sections also provide provisions for the methodology to be used for the purposes of the Act.

## **Part 3 - Powers, Functions, and Duties**

Sections 10, through 12 outline the powers of the Minister, the Authority and enforcement officers to carry out any powers, functions or duties in accordance with this Act. Section 13 outlines the responsibility of any person that imports, possesses, or uses a hazardous substance or new organism to ensure that there are no adverse effects caused by any aspect of the importation or by their use.

## **Part 4 - Environmental Risk Management Authority**

The Environment Risk Management Authority (ERMA) was established under Section 14. The overall purpose of the Authority is to assess and decide on applications for the introduction of hazardous substances or new organisms into New Zealand, including generic medication of all living things within New Zealand. Sections 15 through 24 outline the members of the Authority, delegation and power of the Authority. Section 24A outlines the establishment of Nga Kaihautu Tikanga Taiao and its function in advising and assisting the Authority from the Maori perspective.

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<sup>66</sup> Hazardous Substance and New Organism Act 1996

**Part 5 - Assessment of Hazardous Substances and New Organisms**

These sections limit the importation, development, manufacture, use and release of both hazardous substances and new organisms. This involves the assessment and types of approval (if given) of all applications for the importation and use or releases of hazardous substances and new organisms. Approval is subject to the conditions outlined in Sections 25 through 67. This includes importation, containment, and conditional release as well as exemptions from provisions of this Act for small-scale research. Section 50 provides the provisions for the listing of prohibited organisms and Schedule 2 the specifics for prohibited organisms.

**Part 6 – Controls**

The provisions for a hazard classification system are provided for under Sections 74 and 75 by prescribing a number of degrees or types of hazard for each intrinsic hazardous substance property and a degree of hazard under which a substance is no longer considered a hazard. Section 76 enables the development of regulations regarding the requirements for the containers, identification, disposal, emergencies and tracking of any substance with a hazardous classification. Controls on hazardous substances and the Authority's power to impose and vary controls are outlined in Sections 77 and 77A. The development of Codes of Practice for hazardous substances, their approval, the availability and proof of codes are dealt with in Sections 78 through 81. Provisions for the application for test certificates, for becoming a test certifier and the register of test certifiers are provided for in Sections 82 through 85. The processes for complaining to the Authority are outlined in Section 86. The provisions for the transferring of permits are outlined in Sections 88 through 95, with the establishment of the Transferable Permit Scheme given in Section 87. This includes the actual transfer and modification of permits. Sections 95A and 95B refer to the provisions under which permissions and licenses for substances are granted. The provisions for environmental user charges are outlined in Section 96.

**Part 7 - Inspections, Enforcement, and Ancillary Powers**

Section 97 outlines which agencies are responsible for the enforcement of this Act and under which circumstances; with special emphasis given to new organisms under



Section 97A. Inspection is co-ordinated between the agencies that are responsible for the enforcement, with the provisions for inspectors, their functions, powers, duties and protection are outlined in Sections 98 and 98A. The provisions for inspections are outlined in Sections 99 through 103; this includes the procedures associated with the powers of entry for inspection. Sections 104 to 108 outline the provisions associated with the compliance, form and content, service and cancellation of compliance orders. Section 109 outlines the offences enforceable under this Act, with infringement offences outlined in Section 110. Penalties associated with the offences are outlined in Section 114, and the liabilities of employees and principles, directors and offices of cooperate bodies are outlined in Sections 115 and 116 respectively. Fines are payable to the agency instituting the prosecution in accordance with Section 118. The provisions for search warrants and for the handling of seized goods are outlined in Sections 119 and 120. Section 124 defines the responsibilities of the owner or carrier of any craft arriving in New Zealand. Sections 24A through 24F refer to the provisions relating to pecuniary penalties and associated criminal actions. Liabilities are outlined in Sections 24G to 24I, with the defences against liability listed in Section 24H.

## **Part 8 – Appeals**

Any person may appeal a decision made by the Authority. These appeals can be lodged with the Authority directly, the district court or the high court, as outlined in Sections 125 and 126. The procedures associated with appeals and the right to an appeal are specified in Sections 127 through 134. This includes notices of appeal, the right to appear and the appeal hearing procedures.

## **Part 9 – Emergencies**

Section 139 outlines under what circumstances an emergency maybe declared and who can declare an emergency; with the powers of an authorised person in an emergency outlined in Section 137. Section 138 contains provision for compensation in relation to property that was destroyed as a result of a person conducting his or her duties under an emergency. Authorised persons are also provided with protection from action or proceedings under Section 139.

## **Part 10 - Miscellaneous Provisions**

Section 140 allows for the development of regulations by the Governor-General for the purposes listed in the Section. The Governor-General has also been given provisions to amend schedules under Sections 140A and 140B. The relationship between this Act and other enactments is described in Section 142. Exemptions to this Act are outlined in Section 142A. The procedures relating to injuries and the reporting of serious injuries resulting from hazardous substances or damage to the environment are provided for in Sections 143 and 144.

## **Parts 11 through to Part 16 Transitional Provisions**

These parts provided transitional provisions for pesticides, toxic substances, dangerous goods, explosives, new organisms and also general provisions. These Parts have however expired and are therefore no longer in force.

## **Schedule 1**

The Stockholm Convention on Persistent Organic Pollutants is outlined here, with the purpose of the convention being to protect human health and the environment from persistent organic pollutants. This includes the reduction in the production, release, import and export of chemicals that listed in Annex A, B and C.

## **Schedule 2**

This provides the list of all the new organisms and persistent organic pollutants (Schedule 2A) that are not permitted into New Zealand.

## **Schedule 3**

Schedule 3 consists of 3 Parts, with Part 1 referring to matters to be addresses by containments for [importing, developing or field testing] of generically modified organisms, Part 2 the containment controls for new organisms excluding those genetically modified and Part 3 the containment controls for contained hazardous substances. Each Part provides for containment control procedures and the

procedures to be followed in the event of an accidental release or escape of the organism or substance.

### 5.2.3 The Customs and Excise Act 1996

The purpose of this Act is to:

- *“... Reform the law relating to customs, excise and other duties; and*
- *Provide for the administration and enforcement of Customs controls at the border; and*
- *Repeal the Customs Act 1966; and*
- *Provide for related matters...<sup>67</sup>”*

#### Part 1 - Administration

This part of the Act covers a) the renaming of the Customs Department to the New Zealand Customs Service, b) the authorisation of a person who is not a Customs officer for carrying out any function or power that may be performed by a Customs officer and c) the requirement of authorised personal to carry identification when conducting duties under this Act.

#### Part 2 - Customs Places

##### Customs places

Customs places are any port or airport that the Chief Executive designates as Customs port or Customs airports for the purposes of this Act.

##### Customs Controlled Areas

No area is allowed to be involved in any activities relating to across border movement unless the area is a licensed Customs controlled area. Such licenses are obtained, maintained, extended or revoked through the processes outlined in Sections 11 through 15. The closure of customs controlled areas is subject to Section 16 and all

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<sup>67</sup> Customs and Excise Act 1996

liabilities are as per Section 17. Customs controlled areas are to provide Customs facilities for Customs officers to use as they see fit under Section 18.

### **Customs approved areas of storing exports (CASEs)**

The purpose of CASEs is to enable Customs officers to have access to all goods that are to be exported. Sections 19B through 19H outline the areas that may be deemed CASEs, the license application process, the actual licenses, the access of Customs officers to licensed areas and the power of authorised personal to examine and detain goods and the vehicles that are to export the goods.

## **Part 3 - The arrival and departure of goods, persons and craft**

Goods that are subject to Customs control are outlined in Section 20. Any goods within Customs controlled areas, whether they are deemed for international transport or not, are subject to customs control until they are lawfully removed for consumption or removed from New Zealand territory.

### **The arrival of craft into New Zealand**

Before entering New Zealand territory, any craft must notify Customs of its impending arrival, crew, voyage, passengers, its cargo for discharge, not for discharge and the Customs place of arrival. Everyone on inbound and outbound crafts is required to answer questions asked by a Customs officer relating to the craft, crew, voyage, and passengers and cargo that are or have been carried by the craft. Masters of the crafts are also required to bring their ships to when requested to by a Customs officer in a clearly marked and identifiable craft and, within reason, facilitate the boarding of the craft by the Customs officer. Upon arriving in New Zealand territory, the craft may only land, anchor or otherwise arrive in a Customs place, unless under the mitigating circumstances outlined in Section 25 and provide Customs with an inbound report under Section 26.

### **Arrival of persons**

Unless required by other provisions of this Act, any person arriving in New Zealand must upon arrival report to a Customs officer or to Police at a Customs place until the

Customs officer has conducted his or her duties. Any person upon disembarking a craft either from an origin outside of New Zealand or domestic origin must comply with Customs directions regarding disembarking and go through a Customs area until the Customs officer has conducted his or her duties as outlined in Section 28. Personal baggage, under Section 29, must be accompanied by owners and made available to Customs officer for examination and comply with customs regulations regarding the movement of baggage.

### **Departure of Persons**

All persons boarding a craft for departure and the actual departure must be conducted from a customs area in accordance with the directions given by a Customs officer. As with arriving baggage, all outbound baggage must be made available for examination by a Customs officer and must comply with Customs regulation regarding outbound baggage, and baggage must be loaded onto a craft in a customs area.

### **Departure of craft**

No craft is to depart from any Customs area for a destination outside of New Zealand territories without a certificate of clearance, nor is any craft that arrived from a point outside of New Zealand to depart from the place of first arrival or any subsequent place of call within New Zealand until approved by Customs. The criteria of gaining a certificate of clearance are set out in Section 34, with the fees and charges outlined in Section 34A. All craft departing from a Customs area, whether or not the initial destination is outside of New Zealand territories, are to facilitate the boarding of the craft by Customs officer, and the master of the craft must on request produce the certificate of clearance and answer any question that the Customs officer asks in relation to the craft, its passengers, crew, cargo, stores and its intended voyage or journey. No craft is permitted to depart New Zealand from any area other than a Customs place, unless subject to exemptions that may be prescribed or by prior permission from the Chief Executive, under Section 37.

## **Part 3A - Customs access to and use of information about crossing goods, person and craft**

### **Preliminary provisions**

This addresses the interpretation of terms used with the Sections under this Part, as well as outlining the purpose of these Sections.

### **Who must give Customs access to information?**

This relates to persons to whom Sections 38D through 38E apply to, namely persons that are concerned with the movement of goods, persons or craft and have been required by the Chief Executive to comply.

### **Information to which access must be given**

Persons to whom this Section applies must give Customs access to information in relation to the craft, cargo, passengers and crew numbers and provide individual details such as seating arrangements and baggage store. Persons crossing New Zealand borders are also required to supply Customs with information set out in Section 38E, however, under 38F, no person is obliged to provide Customs with information on employees unless the information is of the kind that the person would generally have on their person.

### **Use of information to which access must be given**

This outlines the criteria, which control Customs use of the information it has access to under the previous sections.

### **Searching and viewing of information about border-crossing persons**

The below Sections give Customs officers the rights for searching and viewing information relating to travel within a 28 day period without a warrant. The criteria for searching and viewing information relating to other travel are set out in Section 38I. The issuing of search and viewing warrants is outlined in 38J, though information searching and viewing may be done in emergencies without a warrant under circumstances specified in section 38K. If information is viewed without authorisation in an emergency and subsequently a warrant was not issued, Customs

must under section 38L, destroy the information. The security for the application of warrants is outlined in section 38M.

### **Miscellaneous Provisions**

The methods or criteria for the disposal of information collected by Customs are outlined in Section 38O. No official person fulfilling his or her duties under this Act is liable unless the person did not act in good faith or without reasonable care.

## **Part 4 - Entry and accounting for goods**

### **Importation of goods**

All imports that are to be imported by an importer into New Zealand are subject to the regulations in this Act. Persons entering any goods into the country must answer all questions that a Customs officer asks in relation to the goods, make the goods available for inspection and pay any duty on the goods subject to import duty. The regulations relating to the importation of the goods are outlined in Section 40. Provisions for developing regulations for fees and charges relating to the importation of goods are outlined in Section 40A. No goods that are subject to the control of Customs are to be unloaded in New Zealand without permits or other authorisation from the Chief Executive unless the craft or the goods within the craft are under threat of collision, fire, weather or other severe conditions described under Section 43.

### **Transportation of imported goods**

Once goods have been permitted entry under Section 39(1) only then may the goods be transported from a Customs controlled area by a craft. The removal of goods from a Customs controlled area is only permitted after goods have been cleared to the satisfaction of a Customs officer. The temporary removal of goods from a Customs controlled area without the payment of duty is subject to approval of the Chief Executive. All such goods remain subject to the control of Customs and are still considered to be within the Customs controlled area from which they have been removed, and all provisions of this Act continue to apply to them.

### **Exportation of goods**

As with the importation of goods, goods that are to be exported are subject to the regulations of this Act. All goods that are to be exported must be entered by an exporter and must comply with prescribed conditions. The exporter must allow a Customs officer to inspect all goods for export and answer any questions asked of them by the Customs officer in relation to the export goods. Exports under drawbacks are deemed to be an entry for drawback under Section 49(3). Section 50 offers the provisions the Governor-General requires to make regulations regarding the entry of goods for export, including regulations regarding the fees and charges under Section 50A. Any goods entered to be exported must be dealt with in accordance to the entry regulations and thus are to be exported outside of New Zealand in accordance with the entry made. Any failure to export the goods within the conditions of the entry must be notified to Customs immediately and any further entry or export will be reviewed. No goods are to be exported and landed in a point outside New Zealand without the permission of Customs.

### **Customs seals**

Customs officers have the ability to apply Customs seals to packages of goods to be exported as well as setting the conditions of seal application, seal alteration, removal, damage, disposal and other interference. The seals that are applied to goods that are not to be exported under the Customs approved secure exports scheme are to have a warning attached explaining the terms of approval, which are listed in Section 53B.

### **Customs-approved secure exports schemes**

Any person involved in the carriage, handling, transportation or exportation of goods for export can apply for Customs approved secure exports schemes. The purpose of these schemes is to help ensure that exported goods are packaged securely, transported securely and without interference to the place of shipment and then shipped. The specifications of the scheme are outlined in Sections 53E. All goods exported under the scheme are still under the control of Customs and therefore all provisions of this Act still apply to the goods and the persons involved. Customs seals may still be applied to the packaging of goods to be exported under the scheme. Exporters may be involved in more than one scheme and can still export goods



outside of any scheme. Once approved, export operations under a scheme are subject to reviews by the Chief Executive.

### **Part 5 - Prohibited imports and prohibited exports**

It is illegal to either import into New Zealand any goods specified in Schedule 1 of this Act or export out of New Zealand any goods prohibited by the Governor-General under Sections 54 and 56 respectively. The duration of both, prohibition on imports and exports, are subject to the Order in Council, with the duration being generally 3 years.

### **Part 6 - Duties**

#### **Valuation of goods**

Every person making an entry of goods imported or to be imported must specify a Customs value for the goods in accordance with Schedule 2 of this Act. In addition, all importers are required to maintain complete records of all documents, records and information with respect to any importation of goods, and these records are to be made available for inspection by a Customs officer. If the evaluation assessment of the imported goods is inconsistent with Schedule 2 or is incorrect for any other reason, the Chief Executive may amend the assessment. Where the amount payable under any provision of this Act is not in New Zealand currency, the equivalent amount in foreign currency is to be paid at a fair rate of exchange determined by the Chief Executive. To protect the Crown's revenue, imported goods, which are evaluated at entry are deemed to be under the control of Customs and can therefore be acquired by the Crown by means of a warrant. After acquisition the Crown is obliged to sell the goods, the conditions associated with the sale are outlined in Section 63.

#### **Origin and Preferential provisions**

The origin of fish and any other produce from the sea or goods produced or manufactured wholly or partly at sea by or on board a ship belonging to a country other than New Zealand is deemed, for the purpose of this Act and the Tariff Act 1988, to have been done in that country and therefore any such produce or products if brought directly to New Zealand are deemed to be imported from that country. The

origin of all other goods is determined by the Governor-General under Section 65. Goods entering New Zealand under preferential rates of duty are required to produce adequate verification of the claim at the time of entry or at any subsequent time. If claims cannot be substantiated to the Chief Executives satisfaction, all goods entering New Zealand will be subject to the rates of duty set out in the Normal Tariff.

### **Part 7 - Excise and Excise-equivalent Duties**

All excisable goods are to be manufactured in licensed areas; these goods include compressed natural gas. The conditions for the entry of excisable goods are outlined in Section 70, with the provisions for the development of regulations regarding the entry of excisable goods provided under Section 71. All excisable goods deemed for home consumption can be removed from the Customs controlled areas once conditions under Section 72 are met. All goods manufactured in licensed areas, unlicensed areas or imported are also subject to duties. Section 76 provides the Crown with provisions to collect outstanding duties through the seizure of the goods, with the licensee of the area, manufacturer or person(s) who own(s) the goods being liable. The Governor-General, under Section 77, has the power to change the rates of excise duty or excise-equivalent duty, though these changes must not exceed the rates specified under Schedule 3. However, Section 79 allows the Governor-General to amend Schedule 3 and impose duty rates that the Governor-General sees fit, though these new rates cannot exceed the rate calculated by the given formula. The Governor-General can provide exemptions under specific circumstances outlined in Section 81.

#### **Miscellaneous duty Provisions**

Duty is still payable on any and all excisable goods consumed on licensed areas before removal, with the exception of excisable goods used in the manufacturing process of excisable goods, except spirits and other alcohols. If the situation warrants, duties may be paid in advance and where payment exceeds actual duties a credit is claimed by the licensee towards other duties.

## **Part 8 - Assessment and Recovery of Duty**

The duties of imported goods are due and payable on importation, the debt is owned by the importer(s) and payable to the Crown. Debts are recoverable by the Chief Executive on behalf of the Crown even after the goods cease to be under the control of Customs. Deference of duties payable is subject to the discretion of the Chief Executive. Any debts that remain outstanding are subject to additional duties, and deference of these additional duties is also subject to the discretion of the Chief Executive. The assessment of the duty on imported goods is conducted by the importer or licensee, though these assessments are subject to review and amendment by the Chief Executive. The payments of duties are due, subject to other sections of this Act, 20 working days after the written notice of the assessment or amended assessment. Every assessment made by the Chief Executive is deemed to be correct unless an appeal is lodged and a different amount is determined. The obligation to pay duties cannot be suspended by an appeal; however, should an appeal be successful any amount paid in excess of the new amount shall be refunded with interest as outlined in Section 93. Every importer or licensee is to keep records regarding duties for a period of no longer than 7 years and these records are to be made available to Customs. The duty on any goods is considered a charge on those goods until fully paid; the purchaser of the goods with charge still owing is not liable, the liability remains with the importer or licensee. Provisions for the recovery of duty from an individual that is bankrupt or a company that is in liquidation are outlined in Sections 98 through 101. No one can remove any goods under controls of Customs until the duty is paid in full, the licensee of the Customs controlled area is liable for the duty of any goods illegally removed or missing. Similarly, the owner(s) of craft are liable for the duty of any goods illegally removed from the craft within New Zealand. If there are any changes made to the law regarding duty rates, the rates at the time of importation or removal from a Customs area are applied. Re-importation of exported goods, may at the discretion of the Chief Executive be re-imported free of duty.

### **Refunds, remissions, and drawbacks of duty**

Claims for refunds and payment of refund can only be made within 4 years of the importation, unless otherwise determined by the Chief Executive. If duties have been paid on goods before the Minister of Commerce approves lower tariff or exempts the

goods from duty, the excess duty is to be fully refunded. Other reasons for the refund of duty are outlined in Section 113. The Chief Executive has the power to apply the refund of duties towards the payment of duties on other duties payable to that person. Any refund made in error or obtained through fraud may be re-obtained by the Chief Executive on behalf of the Crown within four years of the payment. For goods that are imported for a temporary period a sum equal to the duties is acquired as security, and the goods can be removed from the Customs area free of duty. Once these goods have been exported, packed or shipped for export or destroyed to the satisfaction of the Chief Executive the security can be refunded within 12 months of the initial importation. Conditions for the application of drawbacks are outlined in Section 117. Section 118 specifies the provisions for the development of regulations regarding the minimum duty collectable or refundable and the minimum drawback allowable.

### **Part 9 - Customs Rulings**

The conditions for the application to the Chief Executive for a Customs ruling are outlined in Section 119 and the procedures for Customs rulings are outlined in Section 120. Notification of the Customs ruling, the effects of the rulings and the confirmation of the basis for the ruling are prescribed in Sections 121 through 123. The Chief Executive may make amendments to Customs rulings to correct any error that may have occurred. Any amendments are to be given in writing to the applicant. Should a ruling alter the duty of imported goods by increasing or decreasing the duty payable, the conditions for payments and refunds are outlined in Section 124. The conditions under which the Customs ruling ceases are outlined in Section 125. Applicants are able to appeal the outcome of the Customs ruling within twenty working days of the decision; the appeal is to be placed with the Customs Appeal Authority. An applicant is not liable for payment of duties and no penalties are to be placed on unpaid duties nor shall goods be seized, if the applicant is in the process of obtaining a Customs ruling under Section 127.

### **Part 10 - Administrative Penalties**

Penalties are imposed on goods entered, if there has been an error or omission in the information lodged with Customs, resulting in the correct amount of duty not being

paid, or if the entry is otherwise materially incorrect, unless payment is made in full within twenty working days. If payment is not made in full within the twenty working days, the penalties imposed are outlined in detail in Section 128. This Section also defines the meaning of ‘materially incorrect’. Obligation to pay penalties can not be suspended by lodging an appeal or by other legal proceedings. Penalties are not imposed, if the error or omission has been voluntarily disclosed to Customs prior to Customs notifying the liable person of the error or omission, and the Chief executive is satisfied with the reasons for the error or omission, e.g. if the error or omission was made without the liable person’s knowledge. Penalties are also not imposed if the total correct duty is less than \$1000 or if the time between the lodgement of the entry and the first detection of the error exceeds four years.

### **Part 11 - Customs computerised Entry Processing System**

Only authorised persons are permitted to access and remove any information stored within a Customs computerised entry system. Details for the application to gain access to such a system are outlined in Section 132. Each authorised person will be allocated a unique user identifier; the use of the unique identifier and conditions which can be imposed of information access and the cancellation of registration, along with the provision for Customs to keep record of transaction within the system are outlined in Sections 133 through 136.

### **Part 12 - Powers of Customs Officers**

The provisions for Customs officers and other authorised personal assisting a Customs officer to patrol and survey the foreshore and shore of lakes, lagoons, rivers and adjacent land, Customs places or controlled areas; the landing and mooring of craft anywhere in New Zealand; to board, search and detain craft, secure goods on a craft and, where necessary, fire upon a ship to compel it to bring-to, are outlined in Sections 137 through 143. The conditions for the searching of any vehicles are prescribed in Section 144. The questioning of persons regarding goods and duty; personal information (identity, address, etc.); and the questioning of employees and owners or operators of companies associated with any aspect under this Act is made possible under Sections 145 and 146. Persons travelling through New Zealand’s

Customs controlled areas are expected to carry on their person proof of their identity and entitlement to travel as well as provide Customs with the information on demand. The conditions for the detention of persons and the searching of persons are outlined in Sections 148 and 149. The provisions for Customs officers to enter any Customs controlled area or place at any time to examine any goods under Customs control and goods no longer under Customs control are prescribed in Sections 150 through 152. Licensees of Customs areas are expected to be able to provide an accurate account of all goods in their storage, verification of entries and produce the goods on demand. Any communication (oral or written) between legal practitioners and their clients and other legal practitioners are exempt from disclosure under Section 162. The conditions for Customs officers to audit or examine records, the requesting of all related documents, copying and retaining documents and goods obtained from a search are outlined in Sections 159 through 166. The conditions for obtaining and executing search warrants and arresting offenders are outlined in Sections 167 through 174. Section 175 provides for the protection of any person acting under the authority of this act.

### **Part 13 - Offences and Penalties**

#### **Offences in relation to Customs**

The penalties for threatening, resisting, obstructing or interfering with or impersonating a Customs officer are outlined in Sections 176 through 178. Counterfeiting any official Customs seals or marks or any closely resembling of any seal, stamp or mark used by Customs is an offence under Section 179. Every person entering or departing New Zealand who does not comply with any of the requirements set out by Customs is committing an offence and is liable. Any unauthorised person in a Customs controlled area or accessing or misusing or interfering with the Customs computerised system is committing an offence under Sections 181 through 184. Failure to answer questions, produce evidence of identity or goods, to remain at a place when requested or to comply with any other request made by a Customs officer or the Chief Executive is an offence and penalties are outlined in Sections 185 through 189.

### **Offences in relation to Customs controlled areas**

The offences and penalties in relation to Customs controlled area licensees, arrival and departure of crafts, import or export reports, the adaptation of craft for smuggling and interference with Customs seals and cargo, unloading of authorised cargo and goods are outlined in Sections 198 through 201. Although, the penalties for offences in relation to the manufacture, movement and storage of goods are provided for under Section 200. Any failure to make an entry or submitting an incorrect entry, submitting any documents or other forms for declaration that are in any manner incorrect or not genuine, failing to keep the required records or to give Customs access to requested information is committing an offence, the penalties for which are laid out in Section 203 through 205. The disclosure of any information relating to Customs matters is limited under Section 205B. It is an offence to be in possession of incomplete or incorrect documents, if the document is marked or certified as authentic. The use of imported goods for other purposes than they have been entered or failing to comply with the conditions imposed in respect to the entry of the goods is an offence. Every person who imports into or exports from New Zealand any goods which are prohibited by any provisions of this Act is committing an offence. The penalties for these offences are outlined in Sections 209 and 210. Any person evading or enabling other persons to evade any form of payment of duty or in any other form defrauding Customs of revenue is committing an offence. Any person in possession of, purchasing, selling or exchanging goods that are prohibited or uncustomed or concealed are under Sections 212 through 214 committing an offence. The offences and associated penalties in relation to the Customs Appeal Authority are outlined in Section 216.

### **Miscellaneous provisions relating to offences**

If a corporation commits an offence against any provision of this Act, the director, manager, secretary, officer, or agent of the corporation or any other person purporting under the act is liable for the offence, whether in New Zealand or not, under Sections 217 and 218. Any attempt to commit an offence against this Act is an offence and punishable under Section 219. The provisions for the laying of information, court orders in respect to duty payments and for the power of Chief executives to settle petty offences are given in Sections 221 through 223.

**Part 14 - Forfeiture and Seizure**

The conditions of the forfeiture, the process of seizure and post seizure procedures are outlined in Sections 225 through 230.

**Appeals against seizure**

Section 231 provides the means by which a person may appeal a seizure within 20 working days after the notice given. The court may disallow seizures under certain conditions, with seizures being disallowed where no notice was received. If there is no application for an appeal within the 20 working days, then the goods are condemned. A person may apply to have the forfeiture waived by the Minister under the conditions laid out in Section 235.

**General provisions as to forfeiture**

Forfeited goods are to be condemned once the person(s) liable for the goods is(are) convicted, after which the forfeited goods are disposed of either under the conditions outlined in Section 229 or sold, used, destroyed or otherwise disposed of as the Chief Executive sees fit.

**Part 15 - Evidence**

The conditions for using evidence for court proceedings under this Act against any person on behalf of the Crown are outlined in Sections 239 through 243.

**Part 16 - Customs Appeal Authority**

Sections 244 through 253 establish the Customs Appeal Authority, with Sections 254 through 274 dealing with the actual proceedings of the Authority. This includes the nature of appeals, the hearing proceedings, the Authorities powers, the evidence required, the powers to investigate and summon witnesses, the Authorities' decisions and appeals to the High Court.



## **Part 17 - Miscellaneous Provisions**

This part contains sections that are relevant to most parts of this Act. This includes provisions for the application of the Act to postal items, the conditions and limitations of information exchange between Customs, other national departments and international agencies and clarification as to what is meant by ‘giving notice’. The limitations as to the regulations that the Governor-General, by Order in Council, can make are outlined in Sections 286 and 287. The provision for the reporting of the use of reasonable force is provided for in Section 288A. Sections 294 through 306 provide transitional provisions and their applications. This includes; terminology, areas deemed transitional Customs controlled area, examination places, staff accommodation, and conditions relating to appointment or licenses.

### **5.3 Administrative and Advisory Bodies Associated with New Zealand’s Biosecurity.**

The three pieces of legislation summarised above are administered by three government agencies: The BSA 1993 by the Ministry of Agriculture and Forestry (MAF), the HSNO 1996 by the Environment Risk Management Authority (ERMA) and the Custom and Excise Act 1996 by the New Zealand Customs Service (NZCS). The mandate and organisational structure of the three agencies responsible for the administration of the legislation are summarised below.

#### **4.4.1 Ministry of Agriculture and Forestry (MAF)**

The Ministry of Agriculture and Forestry was formed in 1998 from the merging of the Ministry of Agriculture and the Ministry of Forestry. MAF’s mission is to “*enhance New Zealand’s natural advantage.*” With a vision “*to see and contribute to a future where New Zealanders celebrate dynamic, scientifically sophisticated and prosperous agricultural, horticultural, food and forestry sectors leading growth and innovation in the economy and underpinning our ability to achieve the economy, environment and society to which New Zealanders aspire*”<sup>68</sup>.

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<sup>68</sup> <http://www.maf.govt.nz/mafnet/publications/statement-of-intent/2004-2005/maf-soi-03.htm>

The Director General of MAF answers directly to both the Minister of Agriculture and the Minister of Forestry. MAF consists of 10 business groups: MAF Policy, New Zealand Food Safety Authority, Biosecurity New Zealand; MAF Quarantine Services, Crown Forestry Group, Biosecurity Strategic Unit, Strategy and Performance Group, Maori Strategy Unit, Corporate Assurance and Risk and Corporate Services Group.

MAF Policy provides the Ministers with policy advice aimed at advancing New Zealand's agricultural, horticultural, forestry and food sectors, as well as with statistical data and other relevant information and services. Within MAF Policy there are six groups: International Policy; Food, Biosecurity and Science Policy; Sector Performance Policy; Sustainable Resource Use Policy; Policy Information and Regions and Business Services.

The New Zealand Food Safety Authority is a semi-autonomous branch of MAF. Its major function is to provide New Zealand consumers with safe food and food products. This is done through protecting and promoting public health and safety whilst facilitating in the international trade of food and food products.

The Crown Forestry Group manages the Crown's forestry interests over a number of commercial forests and forestry. The day-to-day management of the forests is contracted out, with the Crown Forestry Group conducting audits, providing strategic plans and general administration from Wellington and Rotorua.

The Corporate Service Groups provides support for the entire Ministry, this includes: Strategy and Performance, Corporate Human Resources; Corporate Information–Management and Technology; Corporate Finance; and Corporate Service incorporating Accountability Documents and Ministerial Service, Accommodation and Services, Corporate Communications, Corporate Assurance and Risk and Legal Services. This also includes the Maori Strategy Unit, whose primary role is to implement the MAF Maori responsiveness strategy promoting Maori issues within MAF and to increase MAF's understanding of the Treaty of Waitangi.

**Biosecurity New Zealand (MAF)**

Biosecurity New Zealand is a division of MAF and was established in November 2004, replacing the former MAF Biosecurity and Protect New Zealand. Biosecurity New Zealand's role is to protect New Zealand's biosecurity. This includes our economy, health and environment.

The Biosecurity New Zealand Director-General reports directly to the Minister of Biosecurity. Biosecurity New Zealand consists of six operational units: Business and Planning; Pre-Clearance; Post-Clearance; Policy; Animal Welfare; Compliance and Enforcement; and Investigation and Diagnostic Centres. The Directors of these six units report to the Assistant Director-General, who answers to the Director-General.

**Business and Planning**

This unit provides Biosecurity New Zealand with cost effective solutions for staff to meet their strategic and operational requirements.

**Pre-Clearance**

This unit manages all biosecurity risks until the risks actually receive biosecurity i.e. New Zealand is free of biosecurity risks. This is achieved by four functional groups: Risk Analysis; Biosecurity Standards; Monitoring and Exports. The Risk Analysis team analyses the risks associated with the importation of goods and develops risk assessment processes. The Biosecurity Standards team is responsible for the development of Import Health Standards, operational standards and associated mechanisms (border inspections and accreditation/audit of providers and facilities) as well as working to provide robust processes in cooperation with ERMA for the management of new organism related issues. The Monitoring team monitors the activities at New Zealand's border (sea and air ports) and analyses the data collected in relation to volume moved across borders and related risk exposure. New Zealand's participation with the SPS agreement and Zoosanitary negotiations as well as the development and management of the export certification programmes in association with NZFSA is the responsibility of the Exports team.

### **Post-Clearance**

This team manages the of risks once they have reached New Zealand's border, i.e. risks that have not been excluded through pre-clearance procedures or that are already present in New Zealand. This team consist of two groups, Surveillance and Incursion Response group and Pest Management group. The Surveillance and Incursion Response group is responsible for the management of the development, prioritisation and implementation of surveillance operations in order to determine the presence or absence of incursions and for the monitoring of current pest populations as well as for developing all aspects of the incursion response activities from development of policy to the implementation of the strategies. The Pest management group is also responsible for the coordination of pest management activities conducted by Biosecurity New Zealand.

### **Policy**

This unit provides Biosecurity New Zealand with policies, information, coordination and management processes to ensure the most appropriate and successful outcomes are achieved for the maintenance of New Zealand's biosecurity. The unit consist of five functional teams: Biosecurity Strategic Unit, Policy Group; Strategic Science; International Coordination Group; Maori Responsiveness; and Business Development Group. The Policy Group's function is to develop policy and regulation advice for all the aspects of the biosecurity system for operational groups. The Strategic Science group provides expert advice and coordinates science activities for Biosecurity New Zealand. The International Coordination Group supports international functions of Biosecurity New Zealand including coordinating advice policies and processes. The Maori Responsiveness team provides advice on meeting Maori expectations and facilitating relationships with Maori in relation to all biosecurity matters. Business functions such as financial budgeting and reporting, business analysis, information management and communication are provided by the Business Development Group.

### **Animal Welfare**

The Animal Welfare unit works closely with the National Animal Welfare Advisory Committee and the National Ethics Advisory Committee to provide policies and standards, which promote humane treatment of animals and contribute to market

success for New Zealand's animals and animal products. This group is responsible for the resolution of national animal welfare problems, identifying research needs as well as for cooperating with other national and international agencies associated with animal welfare to ensure that all complaints against animal cruelty are dealt with in accordance with the Animal Welfare Act 1999. Animal Welfare also has a supportive role in domestic policy development and facilitating international trade.

### **Compliance and Enforcement**

This group consists of experienced auditors and law enforcement officers. They conduct audits and investigate the responses to breaches of the laws and regulations administered by MAF. In cases where criminal liability has been ascertained, the group will pursue prosecution.

### **Investigation and Diagnostic Centres**

This team consists of the three laboratories, which investigate and respond to incursions: The National Plant Pest Reference Laboratory; The National Centre for Disease Investigation; and The Exotic Disease Response Centre. The National Plant Pest Reference Laboratories (Auckland and Lincoln) are responsible for the surveillance of plant pests and manage the investigations into incursions of pests and diseases affecting New Zealand's horticulture and forestry sectors. The National Centre for Disease Investigation (Upper Hutt), which incorporates the New Zealand Animal Health Reference Laboratory, is responsible for the diagnoses of animal diseases. The Exotic Disease Response Centre prepares Biosecurity New Zealand for the response to an animal disease or vertebrate pest incursion.

### **MAF Quarantine Service**

The MAF Quarantine Service is the operational branch of MAF Biosecurity New Zealand. This unit operates and contributes to the management of the biosecurity risks associated with the importation of goods, crafts and people at every New Zealand point of entry i.e. all sea and airports. This is achieved by providing biosecurity import management services, technical inspection and the surveillance of goods, crafts and people. The inspectors of MAF Quarantine Service are responsible

for assessing the risks involved with the importation of goods and crafts, inspecting the imported goods and craft and for issuing biosecurity clearance certificates.

#### **4.4.2 Environmental Risk Management Authority (ERMA)**

ERMA was created under Section 14 of the HSNO Act in 1997 to administer the Act and to fulfil its purpose: “...*to protect the environment and the health and safety of people and community by preventing or managing the adverse effects, if hazardous substances and new organisms...*”

To achieve this a panel of eight experts was assembled, balancing knowledge and experience, to assess applications under Part V of the HSNO Act 1996 for the importation, development, and field-tests or release a hazardous substances or new organisms. The panel evaluates the risks and costs and benefits associated with each application and then either approves the application with possible conditions on any of these activities or declines it. Under Sections 35 and 42 of the HSNO Act 1996 the powers to rapidly assess consents for importation of new organisms may be delegated to border protections services (either Customs Services or MAF officers).

Under Section 17 the powers, duties and functions of ERMA under Part V of the Act (Assessment of Hazardous Substances and New Organisms) cannot be changed or influenced by the policy of a Government. This includes the procedure to assess new organisms for import, manufacture, development, field-testing or release. However, ERMA must acknowledge government policy on the control of new organisms as is stated in the HSNO Act 1996:

*“...the Authority shall have regard to the policy of the Government in relation to the control of hazardous substances and new organisms, and shall comply with any general directions relating to that policy determination of a new organism...”*

To avoid the ERMA consent process in the importation of an organism, it is necessary to show that the organism is already found in New Zealand. However, this is often difficult to prove, as there are many organisms in New Zealand, indigenous and exotic, which have yet to be discovered or described.

In addition to its decision making role ERMA also fulfils an advisory role, counselling the Minister for the Environment on the HSNO Act (1996) and other related issues, providing advice to applicants preparing their consent applications and promoting public awareness of risks associated with new organisms.

ERMA monitors approved activities, ensuring that imposed conditions and the HSNO Act 1996 are complied with. Powers are also given to ERMA for investigating accidents or emergencies involving new organisms.

#### **4.4.3 Biosecurity Council**

Established in 1997, the Biosecurity Council (BC) meets to discuss broad policy issues related to biosecurity. Although not a government agency administering legislation, the council provides co-ordinated advice to the Minister for Biosecurity on these matters. The BC comprises of the chief executives of the MAF, Department of Conservation, Ministry of Fisheries, Ministry of Health, ERMA, MAF Biosecurity Authority and representatives from regional councils and industry groups.

The Council's main role is to consider the key issues, which impact on all departments that manage New Zealand's biosecurity. This includes the development of several policies and the purchase of services and research for the Biosecurity Minister, the setting of appropriate levels for New Zealand's biosecurity protection and appropriate responses to biosecurity situations. The BC is also responsible for the development of the Biosecurity Strategy released in 2003 and any future strategy amendments.

It is intended that the BC will enable the co-ordination of biosecurity activities of various government departments with biosecurity responsibilities. To realise this, the BC proposes the harmonisation of the decision-making processes used by the different departments to achieve a more consistent approach to biosecurity situations.

#### 4.4.4 New Zealand Customs Service (NZCS)

New Zealand's borders have been managed by a Government Department in some form since 1840. The then Customs Department and later the New Zealand Customs Department has been independent of the United Kingdom since 1850 and has undergone many changes since. The introduction of the Customs and Excise Act 1996 saw the current naming of the department to the New Zealand Customs Service (NZCS). The NZCS' main focus is to protect and enhance the interests of New Zealand by:

- *minimising the risks to the country arising from international trade and travel;*
- *facilitating legitimate movement of people and goods across borders; and*
- *collecting Customs and excise revenue.*

The Comptroller or Chief Executive is responsible for the overall management of the NZCS and answers only to the Minister of Customs. The NZCS consists of four operational units; Air and Marine, Goods Management, Intelligence and Investigations. Corporate and legal support for all four units is provided by separate corporate units, which consist of the Audit and Business Risk Office, Business Policy and Planning Office, Chief Executive's Office, Finance Office, Human Resources Office and the Legal Office.

##### **Air and Marine**

This operational unit deals with all people and crafts (aircraft, ships and small vessels) that cross New Zealand's borders. At New Zealand's airports Customs officers enforce aspects the Customs and Excise Act 1996, which regulate the movement of goods and people including passport control, baggage searching for prohibited goods, collection of any duty relating to baggage and the searching of the aircrafts themselves. Similarly at New Zealand's many sea ports, Customs officers enforce the relevant parts of the Customs and Excise Act 1996 by ensuring that all vessels (ships, yachts and other sea-going craft) fulfil the required arriving and departing reporting, search selected vessels for any illegal goods or persons. The Customs patrol boat (*Hawk*) is used to patrol and monitor New Zealand's coastline for any sea going craft that has not reported its arrival or departure or is suspected of any illegal activity. In



conjunction with Customs officer's activities, the NZCS welcomes the public to report any activity they deem to be suspicious through the Coastwatch program.

### **Goods Management**

This operation unit is responsible for the monitoring of all cargo movement across New Zealand's borders. It involves collecting and processing the required information from importers and exporters regarding cargo movement, which enable Customs to assess appropriate duties and manage the movement of prohibited goods. This section of Customs also examines cargo and mail by manual inspection, dogs and where possible x-ray machines. There is a 100% inspection of all mail using dogs and x-ray machines; however, it is not feasible to inspect all the cargo, which crosses New Zealand's borders. The Frontline program is a partnership program between NZCS and New Zealand businesses associated with any aspect of goods movement. The aim of this program is to facilitate trade while trying to maintain New Zealand's border management priorities. As with the Coastwatch program, the NZCS welcomes the Frontline businesses to report any activity that they deem to be suspicious or illegal.

### **Intelligence**

This operational unit comprises of a team of analysts which assesses information collected from a diverse range of sources in order to enable Customs officers to better identify and intercept risk persons, goods and craft. Intelligence and risk management strategies derived from the intelligence is made available to every unit of the NZCS.

### **Investigations**

This operation unit is responsible for the investigation and prosecution (where appropriate) of any individual or organisation, which has been or is involved in international trade of illicit commodities and in the evasion of duties and tariffs. Offences against the Customs and Excise Act 1996, the Misuse of Drugs Act and any other legislation covering the movement of goods or persons across New Zealand's borders are investigated by this unit. The unit consists of four functional investigation groups: Drugs, Fraud, Wildlife Enforcement Group and Prohibited Goods. The Drugs group works closely with the Police in its investigations of drug smuggling. The

group is also actively involved in investigating national and international organised crime networks with international agencies. The Fraud group investigates importers and exporters, which are suspected of deliberately evading any duties and/or the General Services Tax (GST). The Wildlife Enforcement group is a joint initiative of NZCS, the Department of Conservation (DOC) and the Ministry of Agriculture and Forestry (MAF) to detect and prevent the trade of endangered species. The group's main priority is to prevent the trade of native fauna and flora including imports, exports and any domestic related activities. The prohibited goods group monitors and investigates the import and export of prohibited or controlled goods and also provides consumer and environmental protection for New Zealand. This involves the investigation and prevention of trade of illegal intellectual property rights, objectionable publications, firearms and other weapons and import and export prohibitions.

### **The Corporate Units**

The Audit and Business Risk team provides the Chief Executive with an independent assessment of the accuracy of all Customs operational group's systems, procedures and controls. In addition the group provides all business units with methods of improving their current operations. The business and planning unit provides the Minister of Customs, other government and senior Customs management with policy advice and is responsible for planning and performance reporting. The Chief Executive's office supports the Chief Executive and the National Management Team, which involves providing advice on communication, international relations and governance, strategic analysis, Ministerial and executive support services. The Finance team is responsible for the collection of the Crown's and Agency's revenues as well as for Customs financial management, reporting and IT management?. The human resources team is responsible for personal development and the working culture within the department. The Legal team is responsible for all legal support and other legal services for the department, with the Customs Department utilising a combination of 57 different pieces of legalisation and Acts to adequately manage New Zealand's borders.

## 5.4 Synopsis

Given that New Zealand is an island nation, biosecurity risks associated with the international movement of commodities and people are generally restricted to its seaports and airports. MAF is the government agency that has the overall responsibility for managing New Zealand's biosecurity management system, including overseeing the management of New Zealand's borders. This is achieved through the implementation of the BSA (1993), which is administered by Biosecurity New Zealand, MAF's operational unit responsible for biosecurity and by MAF Quarantine Service, a section of the service delivery part of MAF Operations working directly at New Zealand's borders. Part 3 of the BSA (1993) (importation of risk goods) contains the sections that have the most relevance to managing New Zealand's borders in relation to the movement of international commodities and people.

The ERMA is the agency responsible for the administration of the HSNO Act (1996), which restricts the importation, manufacture, containment, use and release of hazardous substances and new organisms in New Zealand. The HSNO Act (1996) works in conjunction with both the BSA (1996) and the Customs and Excise Act (1996) through the assessment of any hazardous substance or new organisms for which an application to import, manufacture, use or release has been made. By either approving or denying entry, manufacture, use or release (Part 5) ERMA provides Customs and MAF officials the ability to perform their duties at the border by preventing entry of any prohibited and restricted hazardous substances or new organisms and seize any intercepted risk at the border and detain the persons responsible (Part 7).

The NZCS is directly responsible for the protection of New Zealand's border from illegal activities and biosecurity risks and for revenue collection for the Crown. This agency administers the Customs and Excise Act (1996), which is the key piece of legislation for managing the biosecurity risks at the border level. Its objectives are achieved through undertaking the provisions outlined in Parts 2 (of the Customs and Excise Act 1996) through 14, which provide the NZCS with the ability to restrict the arrival of any goods, crafts or people, inspect and detain any goods, crafts or people being imported or exported.

In order protect its borders, New Zealand has developed domestic legislation, which both compliments its commitments to international trade agreements and provides New Zealand with the means to develop the most effective biosecurity management system. All domestic legislation associated with the management of New Zealand's biosecurity is developed to achieve the best possible balance between biosecurity protection and facilitating international trade.

# Chapter 6:

## New Zealand's Borders and Biosecurity Management

*“Our lines of defence are becoming more sophisticated but are not providing the level of protection needed to match the nature and extent of the invasion – in operational and policy terms” (Anon. 2000).*

### 6.1 Introduction

As humans colonised the world, land masses were divided into several areas of different cultural and later political entities; these separated areas are known as countries or nations and are bounded by borders. The oxford dictionary defines a border as *“a frontier district of a country or territory”* and *“a frontier line which separates one country from another”*.

Modern borders, in comparison to historical borders, are clearly defined as geographical boundaries between political entities or legal jurisdictions such as governments, states or sub-national administrative divisions. There are three types of borders, natural geographical borders, geometric borders and cultural borders. Natural geographical borders consist of land areas that are divided by the topography of the landscape such as mountain ranges, rivers, estuaries and oceans, for example the border between USA and Mexico along the Rio Grande<sup>69</sup> and island nations such as New Zealand. Geometric borders are borders that are formed by drawing a line on geographical or nautical maps, these lines are either straight lines or they follow the curves of latitude, for example the borders of African nations, the Middle East and North American. Cultural borders follow the boundaries between the homelands of different ethnicities, language groups or other culturally different communities: the border between Hungary and Romania are examples of modern cultural borders<sup>70</sup>.

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<sup>69</sup> <http://en.wikipedia.org/wiki/Border> 11-04-06

<sup>70</sup> <http://en.wikipedia.org/wiki/Border> 11-04-06

As borders are a human concept, the natural movement of species does not generally adhere to national borders. This natural movement is known as migration. Natural migration occurs as individuals of a species move from one habitat to another and back again; this may only occur once or can be done repeatedly throughout their life. The time scales of these migrations vary greatly between species. Some do it hourly or daily while others do it weekly, monthly or seasonally and others even do it every few years. The reasons for these movements are species dependent with species moving in order to maintain a specific habitat type or to maintain limited resources. Different activities of species can be conducted in different habitats (Begon *et al.* 1996).

The natural distribution of a species that does not migrate is dependent on natural factors such as ocean and wind currents, geographical barriers (oceans, mountain ranges and rivers), habitat suitability (nutrient availability and climate), the natural range of any species that may act as a disperser (such as seed eaters), the species natural ability to compete for resources, and the species reproductive requirements (such as the need for both a male and female of the species in order to reproduce or the presence of pollinators in the case of plant species). Such natural distributions and the natural colonisation of new habitats by individuals of species can occur across established human defined borders (Begon *et al.* 1996).

Despite the natural movement of some species into new habitats, the rate and method of movements has been altered by human colonisation (Anon. 2001d). Even the earliest of such human colonisations have largely been dependent on the deliberate introduction and spread of plant and animal species as a means to supply basic human needs (Mack and Lonsdale 2001). The introduction of alien species into new ecosystems has been instrumental in the very successful expansion of the human race, however, these introductions have also had negative impacts on the ecosystems into which they have been introduced (Pimentel *et al.* 2000, Campbell 2001, Pimentel *et al.* 2005). Although some of the introduced species appear to have had a benign impact on the environment (Anon. 2001d), a proportion of introduced species (invasive species) have had a very severe negative impact on the environment (Green 2000, Pimentel *et al.* 2000, Anon. 2001d, Pimentel *et al.* 2005).

Levine and D'Antontio (2003) highlighted that the relationship between international trade and the introduction of new species can not be linear as each imported container does not bring with it a new species, instead it brings samples of species from a region that have already been sampled by other ships. Despite Levine and D'Antontio's findings, with the rapid advancement in global trade, transport and travel, the rate at which invasive species are spreading (through intentional and un-intentional means) is also increasing at an alarming rate (Anon. 2001d, Campbell 2001, Lodge *et al.* 2006, Meyerson and Mooney 2007). The biosecurity risk posed by the shipment of any commodity as a result of international trade can be seen as threefold. There is the possible contamination of the vessel itself (ballast water and haul) (Lockett and Gomon 2001, Hewitt *et al.* 2004), the packaging in which the commodity is transported (the sea container and the packaging material used within the container) (Bulman 1992, Gadgil *et al.* 2000, Stanaway *et al.* 2001), or the commodity itself (Anon. 2002b, c, d, e, f, Stephenson 2003, Watson 2004).

Given that the majority of invasive species are spread through international trade, there is a trade off between free trade and nations need to tighten quarantine and border procedures in order to protect against invasive species. This trade off has been the centre of many international agreements and organisations (Chapter 4) leading to the development of international trade procedures which are aimed at facilitating trade whilst reducing the spreading of invasive species. New Zealand, being a member of the WTO and other international organisations, has developed both legislation (Chapter 5) and importation restrictions aimed at protecting its environmental and economic health, whilst having a limited impact on international trade. New Zealand's borders or points of entry and how they are protected are the main focus of this chapter. By outlining what a border is and how species cross these borders, this chapter aims to highlight the biosecurity risks involved in managing all of New Zealand's points of entry associated with the sea container pathway. With the specific aim of:

1. Defining a point of entry;
2. Mapping the distribution of New Zealand's sea and air ports;
3. Mapping the distribution of Transitional Facilities; and
4. Outlining how New Zealand manages the biosecurity risks associated with the sea importation pathway.

## PART 1: New Zealand's Points of Entry

### 6.2 Airports and Seaports

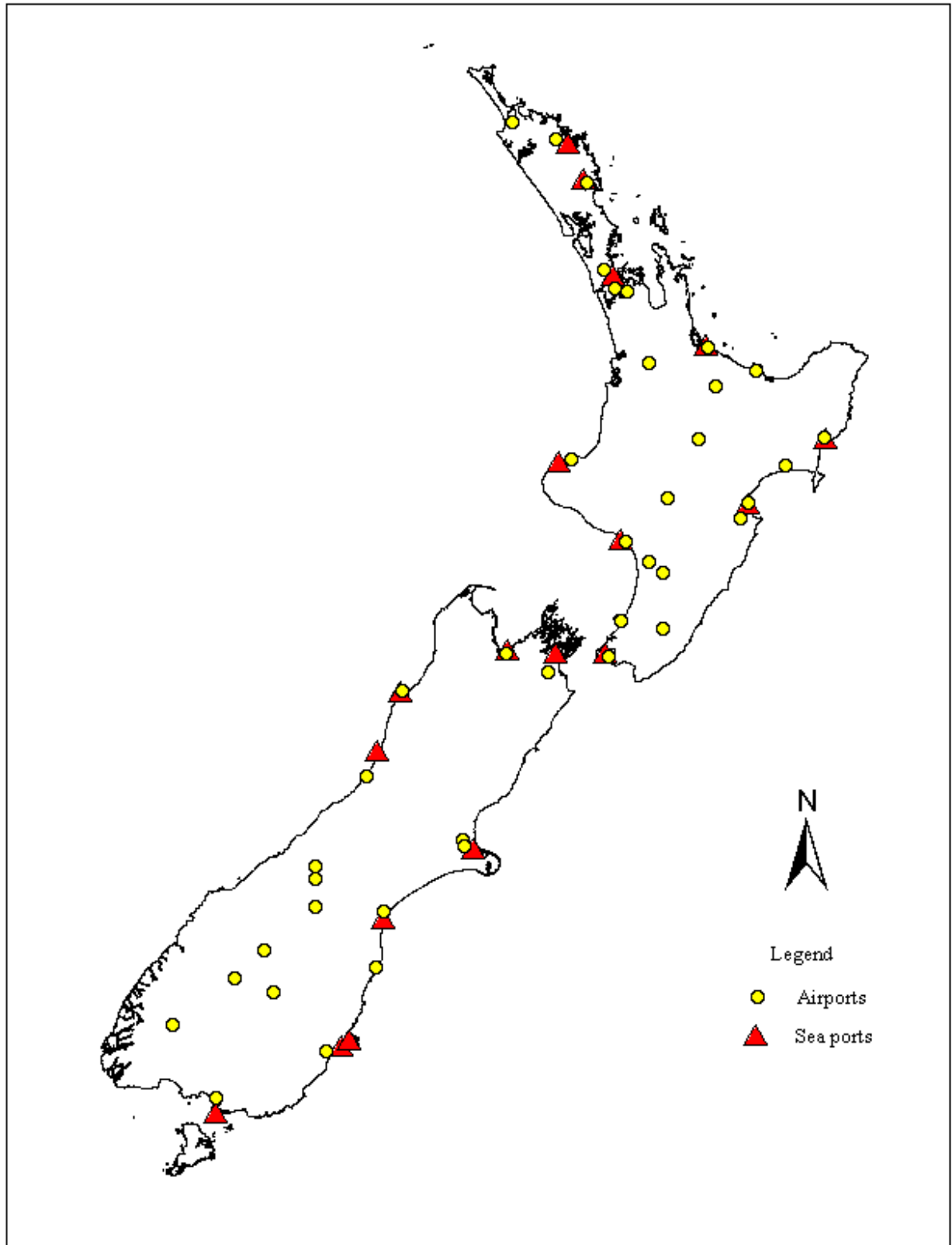
Traditionally, points of entry have been the areas where incoming vessels, commodities and people enter a nation, which have generally been seaports and airports. New Zealand has approximately 39 airports or aerodromes (Figure 6.1 and Table 6.1), of which three major airports are international (Auckland, Wellington and Christchurch) and a further two airports have flights between New Zealand and Australia (Dunedin and Queenstown). In addition, New Zealand has approximately 19 seaports (Figure 6.1 and Table 6.1), with the majority of international trade arriving and departing from six major ports (Auckland, Tauranga, Wellington, Lyttelton, Timaru and Dunedin). New Zealand Customs Service has offices at 16 ports around New Zealand.<sup>71</sup>

**Table 6.1** The number of airports and sea ports per region. (\* represents international airports and sea ports where customs allows international vessels to dock)

Region	Airports	Sea ports	Total
Auckland	4*	1*	5
Bay of Plenty	4	1*	5
Canterbury	6*	2*	8
East Cape	2	1*	3
Hawkes Bay	2	1*	3
Kapiti Coast	-	1	1
Manawatu	3	-	3
Marlborough	1	1*	2
Nelson	1	1*	2
Northland	2	2*	4
Otago	5*	2*	7
Southland	2*	1*	3
Taranaki	1	1*	2
Thames	-	-	0
Waikato	1	-	1
Wairarapa	1	-	1
Wanganui	1	1*	2
Wellington	1*	1*	2
West Coast	2	2	4
Total	39	19	58

<sup>71</sup> <http://www.customs.govt.nz/VisitingCraft/Ports+of+Entry/default.htm> 29-03-2007





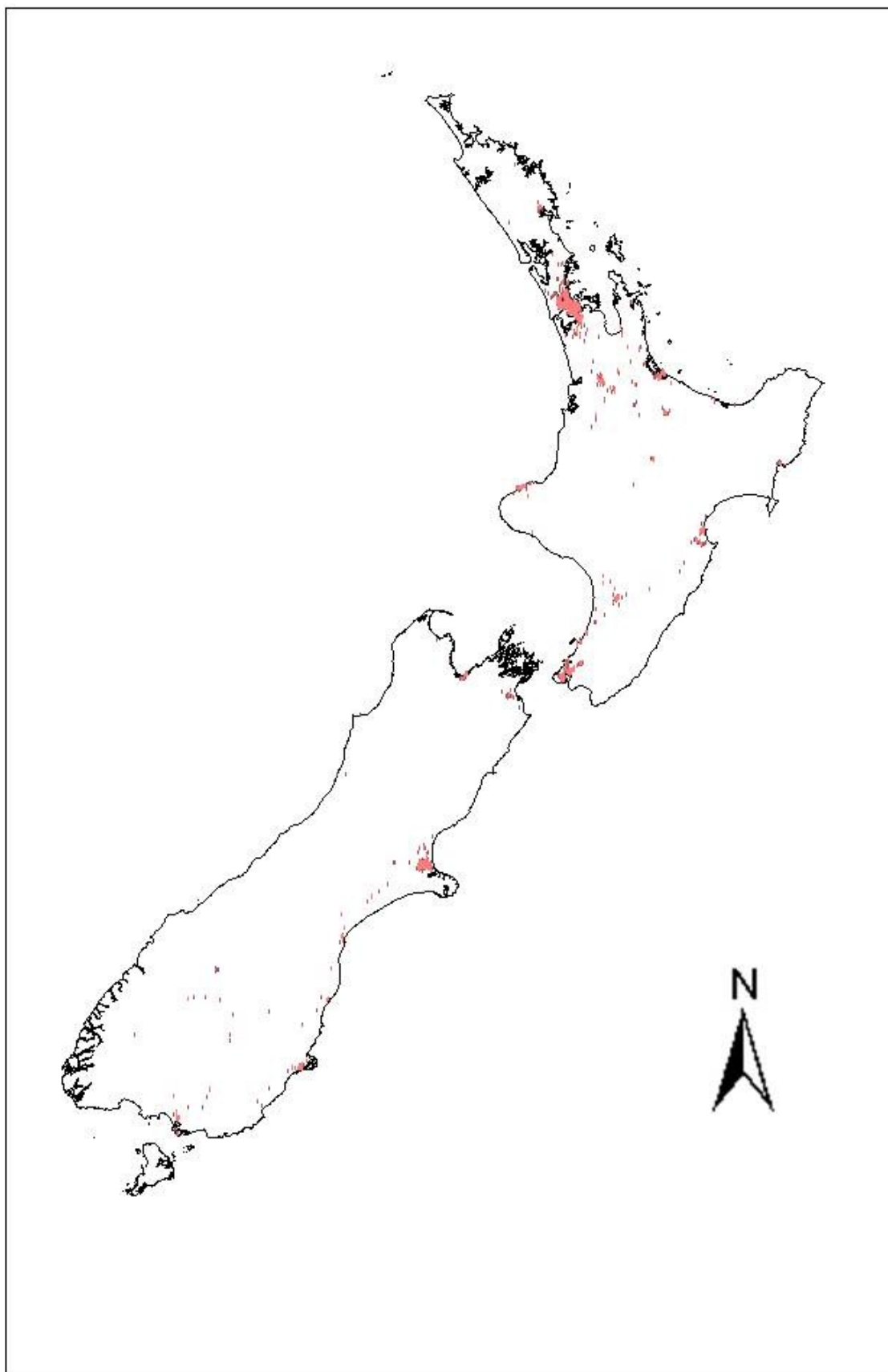
**Figure 6.1** The distribution of New Zealand's airports and seaports

Demands on New Zealand's seaports and airports from increasing international trade have exceeded the infrastructures at traditional points of entry (both seaports and airports), therefore creating the demand for alternative unloading areas known as transitional facilities (Budd 2000).

### **6.3 Transitional Facilities**

Section 39 of the Biosecurity Act 1993 (BSA 1993) allows for the development of an area for the purpose of inspection, storage, treatment, quarantine, holding and destruction of uncleared goods; known as transitional facilities. Any person can apply for any place to become a transitional facility, as long as the person(s) and area meet the requirements of Section 39 of the BSA (1993) and relevant standards. Approved transitional facilities are only suitable for the inspection, storing or treating the goods that the facility is approved for. The owner of the facility is responsible for all aspects of the facility, including all costs incurred for the approval process and monitoring the compliance of the facility. Also, the transport to the facility from either an airport or seaport must be along the most direct practical route within an approved sealed, leak-proof container or vehicle (Anon. 1998). Each facility must have appropriate systems in place, such as security of the site, hygiene requirements and up to date records. If any of the requirements are not met, MAF can remove the transitional facility's approval (Anon. 1998). Approval for each facility is also based on a specific timeframe, after which each facility must reapply for approval. Given this, the number and distribution of transitional facilities varies from year to year.

Since the development of transitional facilities, the number of points of entry in New Zealand has drastically increased and alters annually; in April 2003 the number of points of entry exceeded 7000 (Figure 6.2 and Table 6.2).



**Figure 6.2** The distributions of Transitional facilities through New Zealand (As on April 2003)

**Table 6.2** The number of Transitional facilities (TF) per region. (As on April 2003)

Region	Number of TF	% of total TF
Auckland	3974	55.11
Bay of Plenty	260	3.61
Canterbury	1100	15.25
East Cape	19	0.26
Hawkes Bay	191	2.65
Kapiti Coast	42	0.58
Manawatu	138	1.91
Marlborough	46	0.64
Nelson	92	1.28
Northland	75	1.04
Otago	187	2.59
Southland	81	1.12
Taranaki	99	1.37
Thames	16	0.22
Waikato	324	4.49
Wairarapa	32	0.44
Wanganui	39	0.54
Wellington	489	6.78
West Coast	5	0.07
Unknown- Classified	2	0.03
Total	7211	

As each facility is approved to inspect, hold and treat a specific uncleared risk good, standards have been developed for specific goods, such as sea containers, mail, vehicles, seeds and animal products. The standard for the transitional facility for sea containers was implemented in September 2003 (Anon. 2003h). Under this standard, facilities must have a sealed (concrete, asphalt or similar) area on which all containers must be placed prior to external inspection and to be thereafter unloaded and stored to prevent recontamination. This sealed area must be kept clean and free of vegetation at all times. The sealed area must extend three meters around the container; this area too must be kept free of vegetation, rubbish and debris. Any equipment used to inspect and clean containers must be clearly labelled as belonging to the facility and not to be used for any other purpose. The facility must be manned by either the facility's registered owner or accredited persons; inspections are to be conducted by a MAF accredited person only.

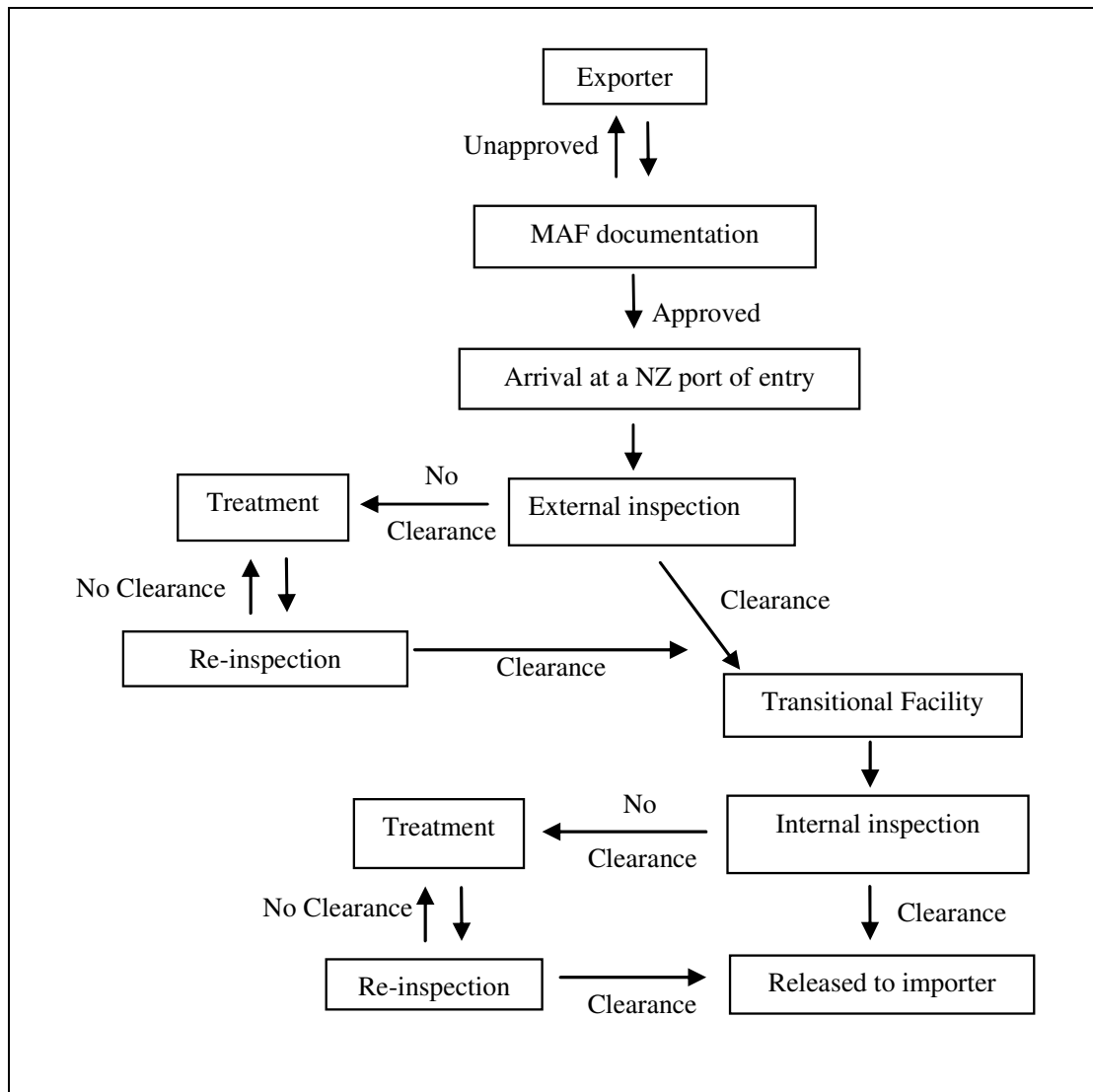
## **PART TWO: New Zealand's Management of the Sea Importation Pathway**

Part 3 of the Biosecurity Act (1993) (BSA 1993) provides MAF with the means to regulate the importation of goods into New Zealand (see Chapter 5). This includes pre-border, border and post border procedures. The main procedure in regulating the importation of sea containers into New Zealand is compliance with Import Health Standards (IHS) (under Section 22 of the BSA 1993). IHS are documents that prescribe the requirements that must be met before a commodity can be imported into New Zealand. Currently there are approximately over 400 operational IHS<sup>72</sup>.

In order to import a sea container and its contents into New Zealand, the importer must comply with import regulations and IHS for both the container and what (if anything) is in the container. These processes are set in place to prevent the smuggling of contraband and the introduction of unwanted species and organisms. The processes for importing a container (Figure 6.3) from any country are described in detail below.

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<sup>72</sup> <http://www.biosecurity.govt.nz/commercial-imports/import-health-standards/search> 14-02-2007



**Figure 6.3** The importation process for the importation of sea containers

#### 6.4 Requirements for the Importation of Sea Containers

In accordance with Part 3 Section 22 of the BSA 1993, MAF has developed IHS for all forms of commodities and transport, which specifies the required conditions and treatment prior and upon arrival of sea containers in New Zealand. The IHS for Sea Containers from all Countries was implemented 27 August 2003 and outlines the management of biosecurity risks associated with Sea Containers and associated packaging of containerised cargo into New Zealand. This IHS is summarised below:

## **Import Health Standard for Sea Containers from All Countries (BMG-STD-SEACO)**

Sections 1 through 3 outline the implementation dates, future review processes, and define terminology used through the document.

### **Information Required Prior to Arrival.**

Section 4 provides for the documentation required for each container and any loaded cargo; documents include quarantine declarations, cargo manifest, cleaning certificate and details on the containers chain of custody. This section also states that no container is to be removed from the port of entry until MAF has received all the required documents and the containers have been given clearance. All non-complying containers will be considered high risk and will be dealt with accordingly.

### **Requirements for Discharge and Holding of Containers**

Under section 5 any container not for immediate delivery from the port is to be held on a hard sealed surface free of soil, weeds and vegetation.

### **Requirements for Inspection**

In terms of biosecurity risk, the inspections covered by this standard are based on four major components: the exterior surfaces, interior surfaces, packing and packaging within the container, and the cargo within the container. However, packaging material and the cargo may be subject to specific IHS in conjunction with this standard.

### **Exterior Surfaces of Containers**

Section 6.1.1 outlines the treatments required for external contamination of all containers arriving that have been identified as high risk by MAF. The requirements for all other containers are outlined in section 6.2. This includes the inspection process and the decontamination procedure should a contaminant be present plus the MAF notification process. Again no container is to be removed from the port of entry unless authorised by MAF.

### **Internal Surfaces of Containers**

Section 6.2 specifies that all containers with manifest containing risk goods or those with incomplete documentation will be unpacked in a transitional facility (approved for both the unpacking and any risk goods specified) by a MAF accredited person. All risk goods (except wood packaging) will be inspected by a MAF inspector. Containers containing non risk manifested cargo are to be unpacked at a transitional facility under the supervision of an accredited person. The process for inspecting and unpacking a container loaded with personal effects is outlined in section 6.2.3, while section 6.2.4 outlines the inspection of empty containers. The procedures for the notification and management of contaminated cargo, packaging, or the presence of unmanifested cargo, non-compliant wood or prohibited packaging material are outlined in Sections 6.2.5 through 6.2.8.

### **Container and Cargo Packaging**

Any untreated wood packaging must be inspected and if the wood is not new and clean, or not free of bark, live organisms, insect damage and decay, the inspector must be notified under section 6.3.

### **Containerised Cargo**

All containers containing uncleared biosecurity risk cargo are to be unpacked at specifically approved transitional facilities. All other containers can be unpacked at transitional facilities under the supervision of an accredited person.

### **Requirements for Transitional Facilities and Operations**

Section 7 outlines the minimum requirements for transitional facilities, its operations and accredited persons. Although for specific technical detail for operations it refers the *Requirements for Transitional Facilities for Sea Containers* standard.

### **Use of Approved Equivalent Systems**

This section allows for the development and implementation of individual systems provided that they can be proven to provide an equivalent standard of biosecurity as efficient as the existing system. This includes systems set in place internationally for the inspection of containers prior to shipping.



### **Audit of Container Clearance Procedures**

Section 9 provides the provisions for the auditing of all clearance systems and facilities as well as providing MAF with the ability to suspend or revoke approval of non complying systems and facilities, and where necessary investigate and prosecute any false declaration or intent to conceal a quarantine breach under the BSA 1993.

### **Costs**

Under section 10 there will be no specific charge by MAF for containers checked by a accredited person, however, any inspection, approvals and other functions undertaken by MAF will accrue a charge as set out in the Biosecurity (Costs) Regulations 2005.

### **Biosecurity Clearance**

This section allows for the unpacking of containers that have been found to be free of contaminants.

## **6.5 Procedures for Cleaning Containers at a Container Depot (Anonymous New Zealand Container Depot)**

This section aims to show how the procedures of the above mentioned IHS are implemented at container depots.

In 2005 three container depots within New Zealand were visited and procedures recorded. The visit included inspecting the facilities (inspection pad, washing pad and storage area) and where possible observing the processing of a container (the arrival of the container on site, the inspection and logging of the inspection into the database). The survey consisted of the depot manager or operations manager explaining the procedures of their particular depot from the moment the container arrived at the port to the time it was released to a client. These surveys of the depots were specifically unstructured to enable the depot manager or operations manager to explain the procedures at their depots in an unbiased manner.

Upon consulting with staff at the undisclosed depots, it became apparent that IHS procedures are implemented differently between different depots and that MAF's

enforcement of the regulations is inconsistent throughout New Zealand. This has also been highlighted in a 2006 report by the Auditor General (see Chapter 2). The procedures at an undisclosed depot are summarised below.

On receiving advice from the shipping company that empty containers are arriving at the port for delivery to a depot, acceptance is to be logged into the depot system specifying a MAF survey in the comments field. This will draw to the attention of all staff that the container must be inspected by a MAF accredited person on arrival to the depot, in accordance with the BSA 1993.

Upon arriving at the depot with the containers, the delivery driver reports to the container control station with the container's details. The container controller will then turn the container over to the depot and it is entered into the depot's system. If a MAF inspection is required, they will immediately see 'MAF' appear in the comments field.

The container controller will advise the unloading fork-hoist by R/T that the container on the specific truck requires a MAF check. On receipt of this information the fork-hoist driver will up lift the container from the truck and place it on the designated inspection area which comprises of asphalt or concrete construction. The fork-hoist driver must ensure the container is MAF-inspected prior to block stacking. At no time must these containers be placed in unsealed areas prior to MAF inspection.

The MAF accredited surveyor is to inspect the containers in accordance with the BS standard BMG-STD-SEACO paragraph 6 and to record the inspection in his handheld software system. Once cleared, the surveyor will complete his survey as required.

Should a contaminated container be found then:

- Surveyor is to immediately shut the doors and secure with temporary seal.
- The container is to remain on the sealed surface;
- Surveyor to notify the container controller that the given container has possible contamination. If significant, controller will notify the MAF hot line of the contamination, and obtain instructions on what MAF wishes to do;

- If instructed to await MAF officer's inspection, the container is to remain sealed and kept aside;
- If instructed to carry out a decontamination wash, the wash is to be carried out in accordance with the MAF procedure already in place; and
- After compliance by MAF officer or MAF accredited surveyor the ICL acceptance survey can be completed.

Survey sheets containing inspection details are to be filed in the main office after completion for data entry into the system. The MAF accredited surveyor is responsible for ensuring that correct procedures are adhered to. If the MAF accredited person finds any contamination, the controller will ensure appropriate documentation required to complete a MAF wash is adhered to. The container controller is to inform the shipping company responsible for the container of the contamination and corrective measures used. It is the responsibility of the surveyor to ensure that this contamination is recorded in the 'Incident Diary'.

#### **MAF Decontamination Procedure:**

Upon recognition of a unit requiring MAF decontamination, the unit remains closed until placed in the appropriate area for cleaning to commence.

The procedure for decontamination is as listed below:

1. Ensure the designated cleaning area (including drains) is clean.
2. Place MAF signage around the cleaning area.
3. Place a sieve in the drain.
4. Wear appropriate clothing (i.e. jacket, pants, gloves, gumboots) as required.
5. Apply appropriate chemical to contaminated area(s).
6. Clean appropriate area until decontaminated.
7. Remove/place unit for re-inspection by qualified personnel.
8. Wash and disinfect designated area ensuring residue sluiced into drain with the MAF sieve.
9. Collect residue from sieve and place in MAF bin.

10. Ensure all equipment (clothes, sieve, etc) are cleaned prior to replacing them in the MAF shed.
11. Remove all MAF signage and place into MAF shed.
12. Advise office upon completion with appropriate paperwork.

### **Time Taken:**

The total time taken to comply with the IHS requirements is on average 15-20 minutes for a clean empty container and 40-45 minutes for a contaminated empty container. These times can be broken down as follows:

- 15 minutes of paper work to get the container into NZ with Biosecurity clearance – done by both the exporter and the importer.
- Drivers/transporters are expected to conduct external inspection as they load the containers onto the trucks at the port.
- 2-3 minutes of inspection once the container reaches the depot. (internal inspection... as the external surfaces have been inspected by transporters)
- If the container is contaminated, another 30 minutes for the decontamination (including equipment preparation, washing, site cleaning after wash, and cleaning and replacement of all equipment).

In addition to the costs of implementing the above procedures, the depot spends \$200 a month on fortnightly audits of their systems by a MAF inspector. The enforcing of this auditing system too, varies between depots and cities (pers com. MAF public consultation meeting 2005).

## **6.5 Biosecurity Costs**

The Biosecurity (Costs) Regulations 2006 were developed for the purpose of formalising the costs associated with the biosecurity clearance of goods and crafts which MAF accrues in its fulfilment of the BSA 1993. Some of those costs MAF passes on to the importer in order to meet its responsibly within the departments budget.

## **Biosecurity (Costs) Regulations 2006**

Sections 1 through 3 give the Regulation its title and commencement date and define the terms used throughout the Regulation.

### **General provisions**

All cost required to be paid to MAF are to be paid to the Director General under section 4. All costs to be paid include GST. The hour cost rates are calculated in section 6.

### **Calculations of Costs**

The provisions for the costs relating to the inspection of hourly rates, travel time, waiting time and call-out costs are provided for under sections 7 through 9.

### **Other Provisions**

Section 11 provides for the discretion of the general inspector to decide whether goods imported are for the personal use of the importer or for commercial purposes. The Waiver of the costs at the discretion of the Director-General is provided for under Section 12

Section 13 Revokes the Biosecurity (Costs) Regulations 2003.

### **Schedule: Costs payable for activities**

This schedule lists the costs payable as specific amounts (for details see Appendix V).

## **6.6 Synopsis**

In order to cope with the ever increasing volume of international trade, MAF has developed transitional facilities to provide over 7000 (as of April 2003) areas where sea containers can be unloaded whilst managing the associated biosecurity risks. Given the development of these transitional facilities, the definition of point of entry

has changed from the traditional sea and air ports to include transitional facilities. This inclusion of transitional facilities alters the distribution of New Zealand's points of entry to areas within New Zealand that are not in the close vicinity of any seaport or airport. The costs associated with approval and maintenance of transitional facilities and MAF activities relating to the inspection of sea containers and their contents are payable by the importer under the Biosecurity (Costs) regulations 2006.

## Chapter 7

# Slippage along Three Importation Pathways

*“From an economic perspective the optimal level of biosecurity may not be that which seeks to exclude all incursions or preserve indigenous biodiversity at all costs”* (Smith and Clough 2000).

### 7.1 Introduction

Given the scale of risks associated with the importation of goods into New Zealand via sea containers, intentional or unintentional, it is inevitable that unwanted pests and organisms are introduced into New Zealand (Anon. 2006d). In accordance with New Zealand’s international obligations (see Chapters 4 and 5), regulations and standards are based on scientific evidence and are aimed at reducing all the risks associated with the goods imported (commodities) and the means by which the commodities are transported (craft and containers). The biosecurity clearance procedures for used vehicles, sea containers, woodpackaging (WP) and bark being imported into New Zealand are outlined in the Import Health Standard (IHS) for Sea Containers from All Countries (September 2003), IHS for Used Buses, Cars, Motor Cycles, Trucks, Utility Vehicles and Vans from Any Country (2001), IHS for Treated Used Vehicles Imported into New Zealand (2003), IHS for Woodpackaging Material from All Countries (2003) and IHS Bark from All Countries (2003).

#### 7.1.1 Slippage - Actual contamination

Despite the relevant IHS and current border management procedures, some used vehicles, sea containers and their contents still enter New Zealand and other importing nations with some form of contamination (Bulman 1992, Bulman 1998, Stanaway *et al.* 2001, Anon. 2003i, Maynard 2004, Brockerhoff *et al.* 2006, Haack 2006). It is the contamination that manages to ‘slip’ through pre-border and border management procedures undetected that has the most potential to allow invasive species to enter and establish within new regions. For the purposes of this study, slippage is the contamination that is not detected or treated at the pre-border and border inspections

and treatments required by importation procedures. As such, slippage represents the actual contamination of used vehicles, sea containers and their contents and packaging that enters New Zealand. Slippage is the means by which potentially invasive species enter a new region unintentionally and potentially establish unmonitored. In a recent audit of the 12,000 containers entering New Zealand, approximately only 80% of contamination was identified at initial border inspections (Anon. 2003i), highlighting the potential slippage rate entering New Zealand and the potential rate of invasive species entering New Zealand.

Previous studies have shown that the proportion of sea containers that are actually contaminated varied, with 9.2% of Less than a Container Load (LCL) containers packed with contaminated WP (Bulman 1992), while only 1.6% of Full Container Load (FCL) containers packed with contaminated WP (Bulman 1998). Between 45% and 50% of containers contain some form of WP (Bulman 1998, Anon. 2003i), with approximately 11.6% of the containers packed with WP contaminated with bark (Anon. 2003i).

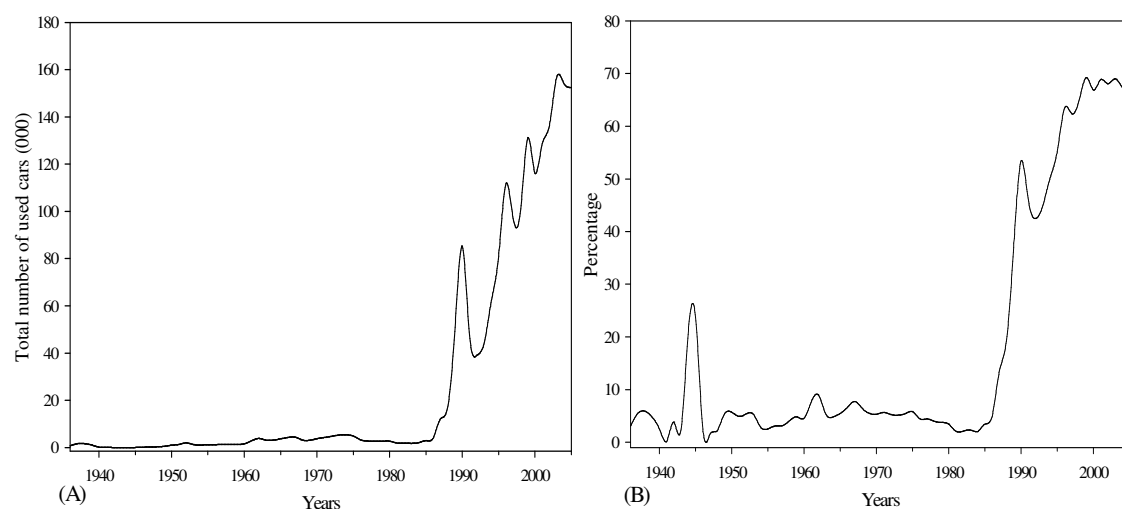
### **7.1.2 Objectives**

As the majority (circa 90%) of all commodities are transported via the sea, the associated importation pathways, more specifically, used vehicles, the sea containers themselves and woodpackaging used within containers have been strongly linked with the spread of unwanted organisms throughout the world. Therefore, mathematical models were developed for the three pathways (sea containers, used vehicles, woodpackaging) in order to gain a better understanding of the actual biosecurity risks (slippage). Although woodpackaging is a subset of the sea container pathway, MAF has issued a separate IHS for woodpackaging. Therefore for the purposes of this study woodpackaging was treated as an individual pathway. Despite bark being a subset of the woodpackaging model, bark was also modelled to highlight the risk that it poses as a contaminant. The pertinent importation procedures, regulations, and risks for the four models developed are given in detail with the specific objective of each model.



### 7.1.2.1 Used Vehicles

New Zealand imports approximately 200,000 used vehicles every year (Figure 7.1), with the majority coming from Japan (Anon. 2006a). Because of the large volume of imports and the high risk associated with this commodity (i.e. the Gypsy Moth (*Lymantria dispar*) incursion in 2002 that was directly linked to imported used vehicles (Ross 2004)), importers of used vehicles are considered risk exacerbators (see Chapter 8) and are therefore expected to pay for the cost of complying with biosecurity requirements for the importation of this commodity (Anon. 2001b, 2005).



**Figure 7.1** The number of used cars registered every year from 1936 – 2005. (A) is the total number of used cars registered 1936-2005 and (B) is the percentage of all cars registered that are used cars for 1936-2005<sup>73</sup>.

The main objective of the used vehicle importation pathway model was to model the procedures involved in the importation of used vehicle into New Zealand. This model encapsulates all used vehicles entering into New Zealand, including cars, trucks, buses, and vans, and excludes new cars as they are not considered to pose a biosecurity risk. The specific aim of this model was to:

- Determine the true number/proportion of contaminated used vehicles entering New Zealand per year (slippage); and
- Assess through a sensitivity analysis which aspect of this pathway has the most influence on the slippage rate.

<sup>73</sup> <http://www.landtransport.govt.nz/statistics/motor-vehicle-registration/2005/> 07 July 2006

### **7.1.2.2 Sea Containers**

Given the increasing number of sea containers entering New Zealand (c. 500,000 per year) and the increasing number of ports of origin (see Chapter 3), it is crucial that New Zealand is protected from contaminated containers in the most efficient manner (Anon. 2006d). To reduce the risks associated with the international movement of containers, MAF has developed an IHS for sea container from any country (Anon. 2003b), in which the procedures required for containers to gain biosecurity clearance and entry into New Zealand are outlined (see Chapters 1 and 5).

The main objective of the sea container model was to model the procedures involved in importation of sea containers into New Zealand. This model encapsulates all containers entering New Zealand, including FCL, LCL and empty containers. The specific aims were to:

- Determine the true number/proportion of contaminated Sea Containers entering New Zealand per year; and
- Conduct a sensitivity analysis to assess which aspect of this pathway has the most influence on the true contamination rate.

### **7.1.2.3 Woodpackaging (WP) and Bark**

New Zealand imports c.260,000 (Anon. 2003i) loaded containers per year, 50% of which contains some form of woodpackaging material (Bulman 1998, Anon. 2003i). Woodpackaging material includes all wood used in the packing of container excluding highly processed wood such as plywood and particleboard (Anon. 2003i, e). With the increase in international trade there has been an increase in the volume of woodpackaging used and thus the associated pest potential. Approximately 15% of all containers entering New Zealand containing woodpackaging material need biosecurity action, namely fumigation or incineration (Anon. 2003i), with contaminants consisting of bark- and wood-boring insects and fungi. In the United States (U.S.) 25 new species of exotic bark- and wood-boring insects (genera: Coleoptera) were found between 1958 and 2005 (Haack 2006). Although not all of these insects were directly linked to woodpackaging, the study highlights that

woodpackaging is a major contributor to the introduction of unwanted insects into the U.S., with beetles from the Coleoptera genus commonly associated with woodpackaging (c.85%).

In order to reduce the biosecurity risks associated with woodpackaging, the FAO as well as individual nations have developed or are developing standards under which woodpackaging can be imported or exported to minimise the spread of these unwanted pests. The FAO International Standard 15 for Phytosanitary Measures: The Guidelines for Regulating Woodpackaging Material in International Trade (2002) (ISPM 15) has been adopted by New Zealand and several of its major trading nations including the U.S. and Australia. In addition to adapting the FAO standard, New Zealand has also developed an IHS specifically for woodpackaging from all countries.

The objective in modelling the woodpackaging pathway was to develop a model that encapsulates all woodpackaging which enters New Zealand including highly processed wood, with the specific aim to:

- Determine the true number/proportion of contaminated woodpackaging entering New Zealand per year (slippage); and
- Conduct a sensitivity analysis to assess which aspect of this pathway has the most influence on the true contamination rate.

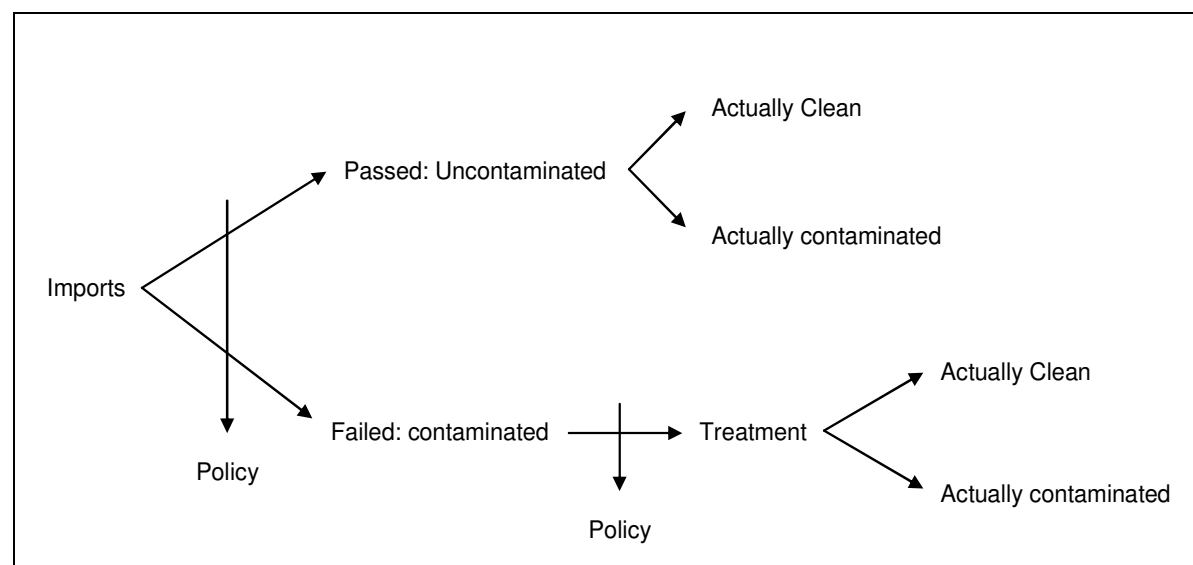
Bark (the outer layers of cork cambium and phloem tissues of woody plant species) is imported either as a commodity or as a contaminant of imported wood products and woodpackaging material. The bark that is imported as a commodity is subject to regulations under the IHS Bark from All Countries (2003). Although the importation of bark as a commodity has risks associated with it (Work *et al.* 2005), this section is only concerned with the importation of bark as a contaminant of woodpackaging. Bark has been identified as a major risk associated with woodpackaging (Bulman 1992, Bulman 1998, Anon. 2003i, Haack 2006, Zahid 2008, Haack and Petrice 2009, Vinzzini 2009). A large survey of over 10,000 randomly selected containers entering New Zealand (Anon. 2003i) showed that 11.6% of all woodpackaging material is contaminated with bark.

As bark in this section is the bark associated with importation of woodpackaging material, all the international standards and national import health standards that are for woodpackaging apply to bark. The objective was to model the importation pathway of bark as a contaminant of woodpackaging. This model is an extension of the woodpackaging model, with the specific aim of:

- Determining the true number/proportion of containers entering New Zealand with WP contaminated with bark; and
- Conduct a sensitivity analysis to assess which aspect of the pathway has the most influence on the true contamination rate

## 7.2 Methodology

All commodities that enter New Zealand follow a similar general pathway (Figure 7.2). The approach used to estimate slippage along three major importation pathways (sea containers, used vehicles, woodpackaging, as well as bark as a subset of woodpackaging) into New Zealand is described in this section. A range of variables were simulated for each of the three pathways to assess their effect on total slippage.



**Figure 7.2** Diagrammatic representation of a general pathway model. Policy refers to the sections in the pathway where policy and management decisions are made.

In order to estimate total slippage along each of the three pathways, models for each pathway were developed based on data collected from several sources.

### 7.2.1 Decision Tree Models.

A decision tree model is a model where each decision has a given number of outcomes which in turn can trigger more decisions or is the final outcome, creating a branching effect. The resulting model yields a likelihood measure or outcome as a direct result of a series of decisions. Decision tree models have been used to assess the outcomes of decisions in many sectors, including financial decisions and cost effectiveness of medical treatments (Gambhir *et al.* 1996).

Decision tree models were constructed for each of the three pathways, used vehicles, sea containers, woodpackaging and a model was also constructed for Bark as a subset of the woodpackaging model. The models were constructed to assess the likelihood of slippage along each importation pathway resulting from a series of policy decisions. The explicit probability of each outcome (slippage) within the model was obtained from a series of various sources, each of which differ for each pathway: these sources are listed in the subsequent detailed description of each model.

### 7.2.2 The sensitivity analysis:

Since the impact of each policy decision on slippage is not known, a sensitivity analysis was performed on each decision tree. This involved varying each of the policy decisions for each of the models and assessing the impact of each variation on overall slippage along each pathway.

The sensitivity analyses were carried out by modifying the main policy decisions associated with each of the three models:

- **Used Vehicles:**
  - The proportion of used vehicles inspected and treated pre-shipment
  - The proportion of used vehicles inspected upon arriving in New Zealand
  - The accuracy of inspections
  - The success rate of treatments
- **Sea Containers**

- The proportion of containers entering New Zealand given an external inspection
  - The proportion of containers entering New Zealand treated for external contamination
  - The proportion of containers entering New Zealand given a full internal inspection
  - The proportion of containers entering New Zealand treated for internal contamination
  - The accuracy of inspections
  - The success rate of treatments
- **Woodpackaging (WP) and Bark:**
    - The proportion of containers with WP identified at first inspection
    - The proportion of containers with WP that have been marked with the ISPM 15 stamp
    - The proportion of containers with known WP inspected
    - The proportion of containers with known WP treated
    - The accuracy of inspections
    - The success rate of treatment

### 7.2.3 Weaknesses of the models

The main purpose of these models was to establish a framework to analyse the impact of different aspects of the importation pathway on the total slippage that enters New Zealand. Several assumptions had to be made in order to construct the models, mainly due to a lack or the unavailability of concise information, constituting weaknesses of the models developed:

- **Inspection efficiency:** The accuracy of the inspection of sea containers and their contents or vehicles is very difficult to measure. Data from several sources indicate that currently MAF tolerate a minimum of 97% accuracy from MAF inspectors, therefore current inspection efficiency is assumed to be 97%.

- **Treatment efficiency:** The effectiveness of the treatment of vehicles, sea containers and their contents is also difficult to measure. Treatments are based on the life biology of known contaminants. Data from several sources gave ambiguous estimates of actual treatment efficiencies, often referred to as in the 'high 90% range'. Given this information, treatment efficiency was assumed to be 98% for the models developed.

### **7.3 Results**

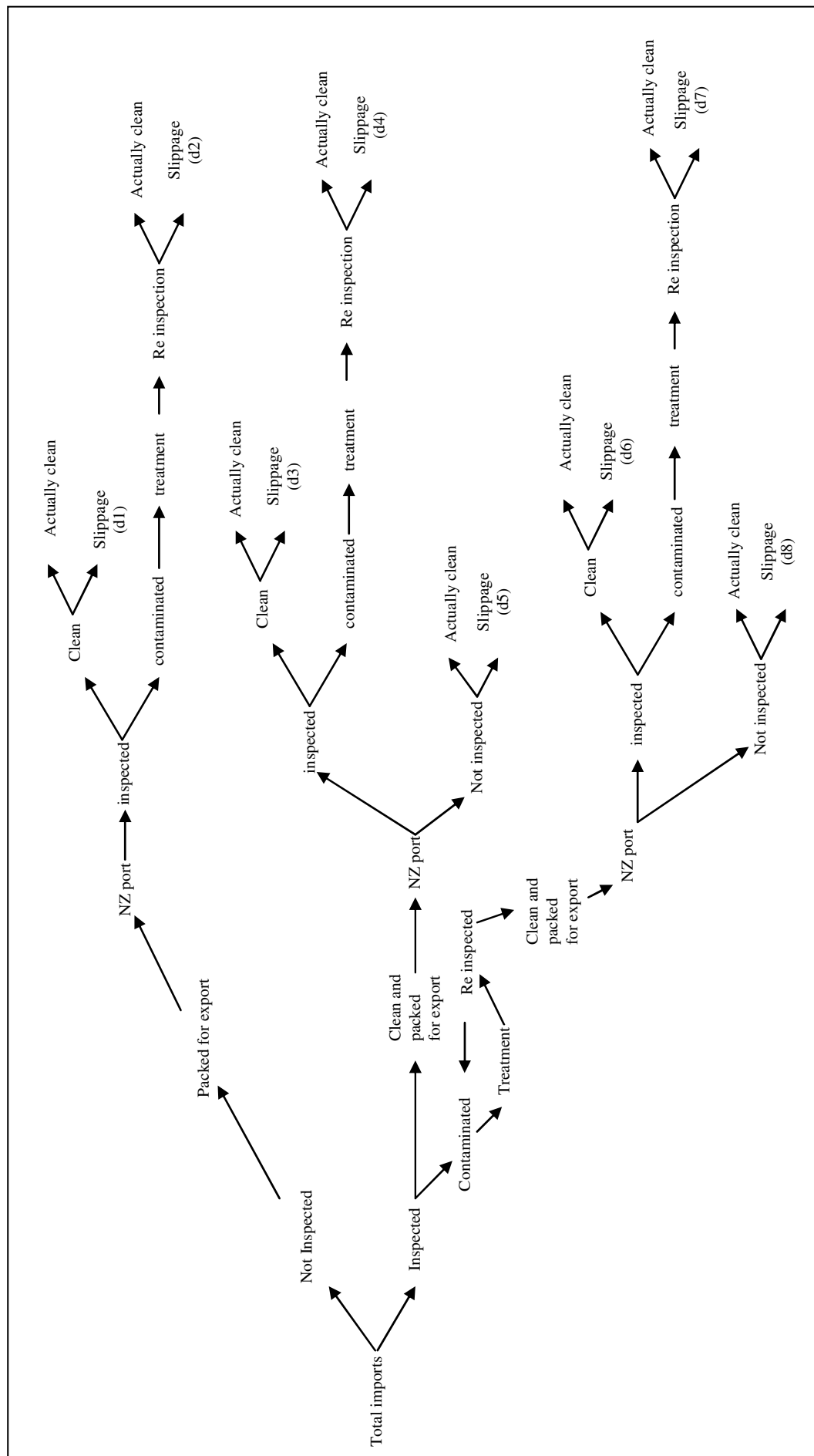
Total slippage along the three pathways measured (sea container, vehicles, WP and bark) was simulated with the three models developed as described in sections 7.3.1 through 7.3.3 respectively.

#### **7.3.1 Used Vehicles**

##### **7.3.1.1 The model**

This model was developed in order to estimate the number of used vehicles that had entered New Zealand which were actually contaminated (slippage) although they were given biosecurity clearance (Figure 7.3). The model in its simple form incorporated all the aspects of the importation pathway which had a direct impact on the used vehicles, including the possibility of consignments entering New Zealand without undergoing any biosecurity management procedures. The model estimated the total number of used vehicles that were actually contaminated but entered New Zealand undetected (total slippage) (see Appendix IV for the equations used).





**Figure 7.3** Diagrammatic representation of the Used vehicle pathway (For a detailed description of the model see Appendix II)

**Table 7.1** The legend for Figure 7.3. The decisions for the vehicle importation pathway model

Symbol	Decision	Current Values (%)	Data source
A1	The rate of pre-shipment inspection	51	{Anon., 2005 #71}
a1	The rate of border inspection for vehicles that had no pre-shipment inspection	100	{Anon., 2003 #99}
a2	The rate of border inspection for vehicles that had pre-shipment inspection but had no treatment	10	{Anon., 2003 #99}
a3	The rate of border inspection for vehicles that had pre-shipment inspection and treatment	10	{Anon., 2003 #99}
B1	The rate of pre-shipment treatment	53	{Anon., 2005 #71}
b1	The rate of border treatment for vehicles that had no pre-shipment inspection	99	{Anon., 2003 #99}
b2	The rate of border treatment for vehicles that had pre-shipment inspection but had no treatment	1	{Anon., 2005 #71}
b3	The rate of border treatment for vehicles that had pre-shipment inspection and treatment	1	{Anon., 2005 #71}
d	The level of inspection efficiency	97	{Anon., 2003 #99}
e	The level of treatment efficiency	98	Anon. Source 3, 2006
T	Total number of imported used vehicles		{Anon., 2005 #71}

**Decision: Status quo**

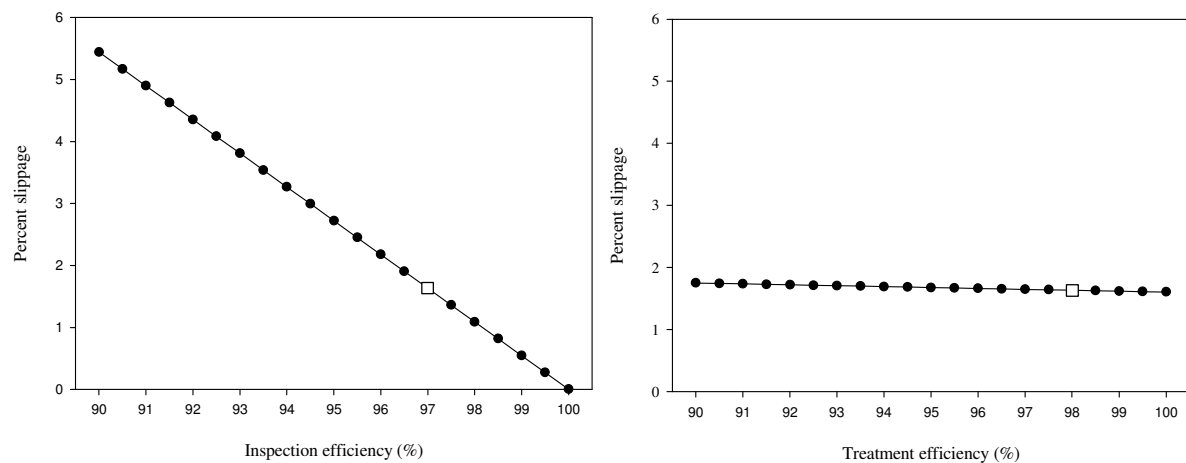
Based on regulations in place on 01 January 2006 and data from (Anon. 2005), approximately 51% of all used vehicles that are imported into New Zealand from Japan were inspected prior to packing for shipment. Of those that were inspected, 51% were found to be contaminated in some form. Under current regulations, 100% of used vehicles imported into New Zealand without pre-shipment inspections are to be inspected upon arrival, while only 10% of those that have had pre-shipment inspection are to be inspected upon arrival (Anon. 2005). In a recent study, close to 100% of the used vehicles imported without prior inspection and treatment were found to be contaminated upon arrival and are treated as required. In contrast, only approximately 1% of used vehicles that had been inspected prior to shipment were found to be contaminated in some form (Anon. 2005).

However, according to the model developed in this research used vehicles imported that had no inspection or treatment prior to shipping had the lowest rate of actual contamination (slippage) (0.04% or 79 vehicles) (Table 7.2), while vehicles which were inspected and treated when required had a slippage rate of 1.59% (2890 vehicles). The overall slippage rate was 1.63% (2969 vehicles).

**Table 7.2** The slippage rates of used vehicles imported into New Zealand under current regulations.

Pre-shipment inspection decision	Number of used vehicles	Total Clean	% Clean	Total Slippage	% Slippage
None	85453	85374	46.957	79	0.0434
Inspection:	96362	93472	51.411	2890	1.5895
- deemed clean	47217	45801	25.191	1416	0.7788
- deemed contaminated	49145	47671	26.219	1474	0.8106
<b>Total</b>	<b>181815</b>	<b>178846</b>	<b>98.367</b>	<b>2969</b>	<b>1.63</b>

The model further predicted that total slippage of vehicles per year under current regulations altered with varying inspection and treatment efficiencies. There was a 5.44% (9891 vehicles) decrease in slippage, if inspection efficiency alone was increased from 90% to 100%, while increasing treatment efficiency decreased total slippage by 0.15% (272 vehicles) per year (Figure 7.4). This indicates that inspection efficiency has a stronger influence on total slippage (decreasing slippage by 0.5% or circa 900 vehicles per percent of efficiency increased) than treatment efficiency, which decreased slippage by no more than 0.024% or 44 vehicles per year per percent increased (Table 7.3).



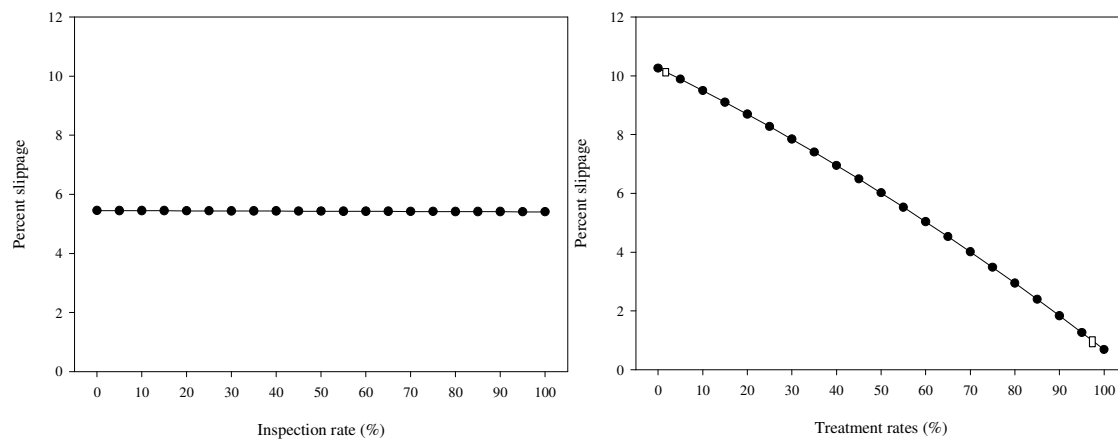
**Figure 7.4** The change in total slippage with varying inspection and treatment efficiencies per annum. The current efficiency rates are represented by empty squares.

**Table 7.3** Decision Status quo with varying inspection and treatment efficiencies. Displayed are the highest, middle and lowest treatment efficiencies per inspection efficiency. Bold is the status quo.

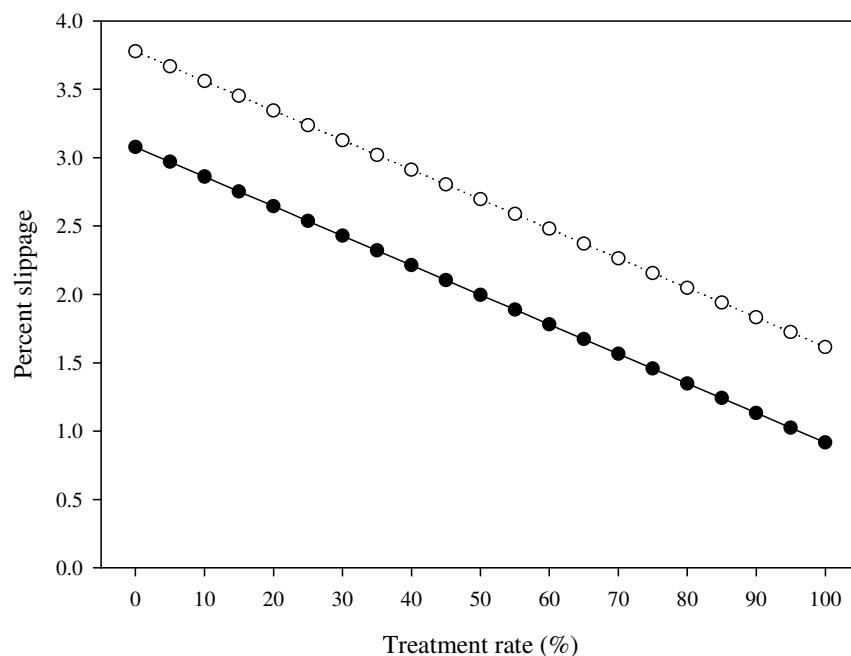
Inspection Efficiency (%)	Treatment Efficiency (%)	Total slippage	% slippage	Total clean	% clean
100	100	0	0.000	181815	100.000
100	98	2	0.001	181813	99.999
100	95	5	0.003	181810	99.997
99	100	972	0.535	180843	99.465
99	98	991	0.545	180824	99.455
99	95	1019	0.561	180796	99.439
98	100	1944	1.069	179871	98.931
98	98	1980	1.089	179835	98.911
98	95	2033	1.118	179782	98.882
97	100	2916	1.604	178899	98.396
<b>97</b>	<b>98</b>	<b>2969</b>	<b>1.633</b>	<b>178846</b>	<b>98.367</b>
97	95	3048	1.676	178767	98.324
96	100	3888	2.139	177927	97.861
96	98	3958	2.177	177857	97.823
96	95	4062	2.234	177753	97.766
95	100	4860	2.673	176955	97.327
95	98	4947	2.721	176868	97.279
95	95	5076	2.792	176739	97.208

### Decision: Compulsory border inspection and treatment

In order to reduce the risks associated with the importation of used vehicles, the model assessed the effect of compulsory inspection and treatment of all used vehicles entering New Zealand, irrespective of the vehicle's origin and pre-shipment management. Varying the proportion of vehicles inspected upon arrival had little effect on total slippage, only decreasing slippage by 0.0424% (77 vehicles) as inspection increases from 0% to 100% (Figure 7.5 and Figure 7.6). In contrast, the proportion of vehicles treated upon arrival irrespective of pre-shipment management or border inspection decreased slippage by 9.57% (17400 vehicles) per year when increasing proportion treated from 0% to 100%. This difference influence on total slippage between inspection and treatment efficiencies can be attributed to the fact that once treated, used vehicles were not re-inspected.

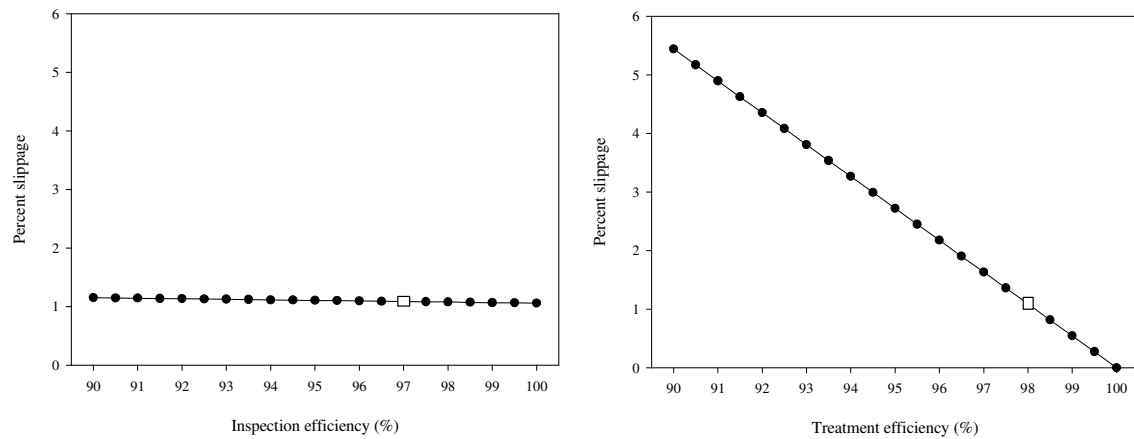


**Figure 7.5** Change in total slippage as a result of varying border inspection (A) and treatment rates separately(B). (□ represents current rates)



**Figure 7.6** The change in total slippage at two inspection rates and varying proportion of vehicles treated upon arrival in New Zealand. (● represents current border inspection rate and ○ represents compulsory border inspection rates)

As all used vehicles are treated upon arrival, the proportion of vehicles inspected (inspection rate) and inspection efficiency had a limited effect on total slippage (Figure 7.7), decreasing slippage by less than 0.03% (48 vehicles) per year per percent inspection efficiency increased. In contrast, treatment efficiency had a stronger influence on total slippage, decreasing slippage by c. 0.55% (1007 vehicles) per year per percent increased (Table 7.4).



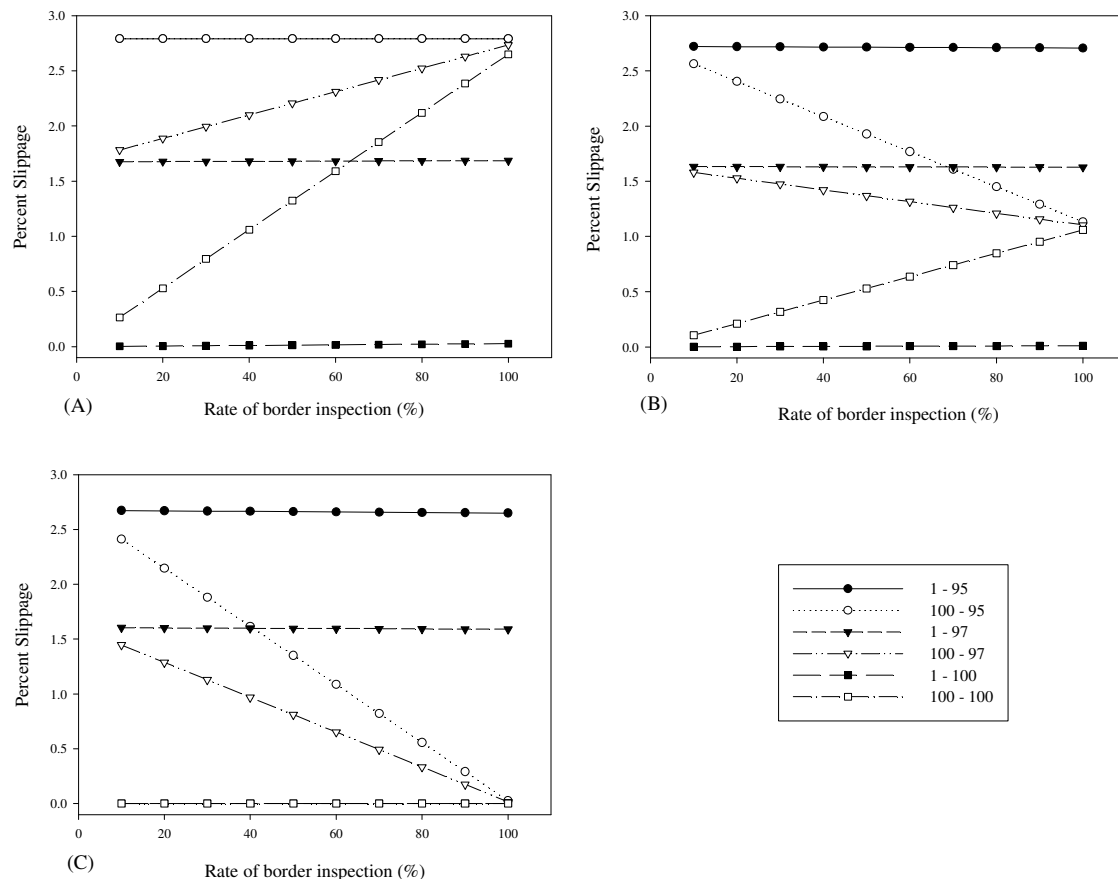
**Figure 7.7** The effect that varying inspection and treatment efficiencies have on slippage when all used vehicles are inspected and treated upon arriving in New Zealand (□ represents the current efficiencies)

**Table 7.4** Decision: Status quo pre-entry and compulsory border inspections. A comparison between compulsory and current treatment with varying inspection and treatment efficiencies. Displayed are the highest, middle and lowest treatment efficiencies per inspection efficiency. Data in the form of total slippage and % of total

Inspection efficiency	Treatment efficiency	1% Treatment		100% treatment	
		Total	%	Total	%
100	100	0	0.00	0	0.00
100	98	19	0.01	1927	1.06
100	95	48	0.03	4818	2.65
99	100	963	0.53	0	0.00
99	98	1000	0.55	1944	1.07
99	95	1054	0.58	4861	2.67
98	100	1927	1.06	0	0.00
98	98	1980	1.09	1961	1.08
98	95	2059	1.13	4904	2.70
97	100	2890	1.59	0	0.00
<b>97</b>	<b>98</b>	<b>2960</b>	<b>1.63</b>	<b>1979</b>	<b>1.09</b>
97	95	3065	1.69	4946	2.72
96	100	3854	2.12	0	0.00
96	98	3940	2.17	1996	1.10
96	95	4071	2.24	4989	2.74
95	100	4817	2.65	0	0.00
95	98	4921	2.71	2013	1.11
95	95	5076	2.79	5032	2.77

The interaction between inspection and treatment rates and efficiencies showed that increasing the proportion of vehicles inspected upon arrival had minimal influence on

slippage when treatment proportions remain at 1% (current proportions i.e. only vehicles without pre-shipment inspection or treatments) (Figure 7.8). However, when all vehicles required compulsory inspection and treatment, the increase in inspection and treatment efficiencies decreases total slippage (Figures 7.8 B and C). This highlights that reducing the proportion of vehicles inspected and treated at the border based on the pre-shipment procedures negatively impacts on total slippage.



**Figure 7.8** Change in total slippage for (A) 95% Treatment Efficiency, (B) 98% Treatment efficiency and (C) 100% Treatment efficiency with three inspection efficiencies (95%, 97% and 100%). In the legend the 1<sup>st</sup> number represents the treatment rate in % and the 2<sup>nd</sup> number the inspection efficiency in %.

### Decision: Compulsory pre-shipment inspection and treatment

In order to reduce the potential risks that are associated with importing used vehicles while limiting the down time of the vehicles upon arriving in New Zealand, pre-shipment inspection and treatment (where necessary) have been recommended by MAF. All used vehicles that have undergone pre-shipment management that meet MAF's requirements are treated in a different manner to those that have not

undergone any pre-shipment management (Anon. 2003c) resulting in shorter processing times upon arrival.

With compulsory pre-shipment inspection, there was no difference in total slippage between current proportion of vehicles getting treated and all vehicles being treated prior to shipment (Table 7.5). However, varying both inspection and treatment efficiencies did affect total slippage rates. Inspection efficiency, when increased from 95% to 100%, had a stronger influence on slippage, decreasing overall slippage by c. 1.02% (1801 vehicles) per year, while treatment efficiency decreased slippage by no more than 0.01% (18 vehicles) per year.

**Table 7.5** Comparison between pre-shipment treatment with 100% pre-shipment inspection rate and status quo border activities with varying inspection and treatment efficiencies. Data in the form of total slippage and % of total slippage.

Inspection Efficiency	Treatment efficiency	51% Treatment		100% Treatment	
		Total	%	Total	%
100	1.00	0	0.00	0	0.00
100	0.98	36	0.02	36	0.02
100	0.95	89	0.05	89	0.05
99	1.00	1800	0.99	1800	0.99
99	0.98	1836	1.01	1836	1.01
99	0.95	1889	1.04	1889	1.04
98	1.00	3601	1.98	3601	1.98
98	0.98	3636	2.00	3636	2.00
98	0.95	3690	2.03	3690	2.03
97	1.00	5401	2.97	5401	2.97
<b>97</b>	<b>0.98</b>	<b>5437</b>	<b>2.99</b>	<b>5437</b>	<b>2.99</b>
97	0.95	5490	3.02	5490	3.02
96	1.00	7201	3.96	7201	3.96
96	0.98	7237	3.98	7237	3.98
96	0.95	7290	4.01	7290	4.01
95	1.00	9002	4.95	9002	4.95
95	0.98	9037	4.97	9037	4.97
95	0.95	9091	5.00	9091	5.00

### **Decision: Compulsory pre-shipment inspection and compulsory border inspection and treatment**

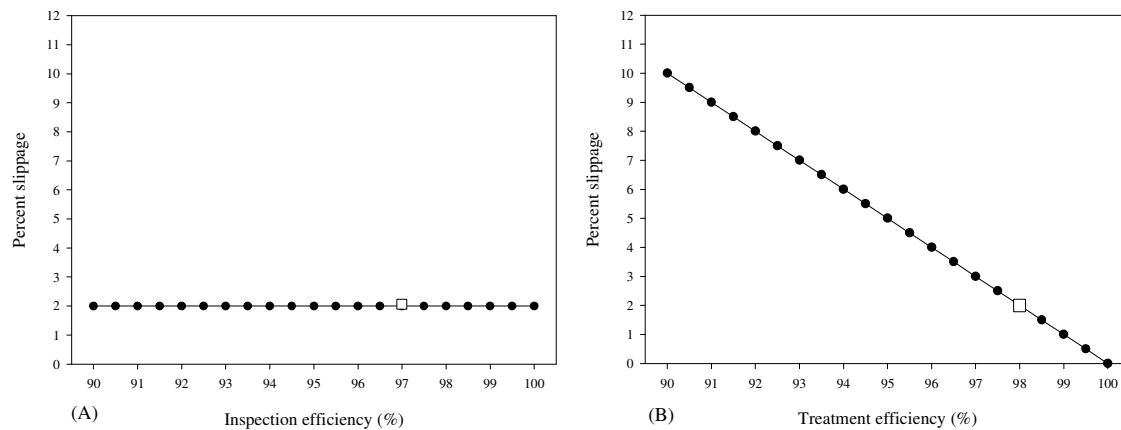
Although compulsory inspection did not affect the overall slippage rates (Table 7.6), to further reduce the possibility of slippage and to identify the types of contaminants, contamination origin and overall contamination rates, pre-shipment inspection was



still used as a variable (in conjunction with border management) in order to obtain data that could be of use in the future management reviews of the used vehicle importation pathway. With compulsory pre-shipment and border inspection and treatment of all (100%) vehicles imported, inspection efficiency had no effect on overall slippage (Figure 7.9). In contrast, treatment efficiency strongly affected total slippage, decreasing slippage by 10% (18182 vehicles) per year when the efficiency was increased from 0% to 100%. Therefore as the inspection and treatment efficiencies interact, slippage decreased by 1% (1818 vehicles) per year per percent increase of treatment efficiency (Table 7.6). Again this difference in influence between inspection and treatment efficiencies can be attributed to the lack of re-inspection of used vehicles once they have been treated at the border.

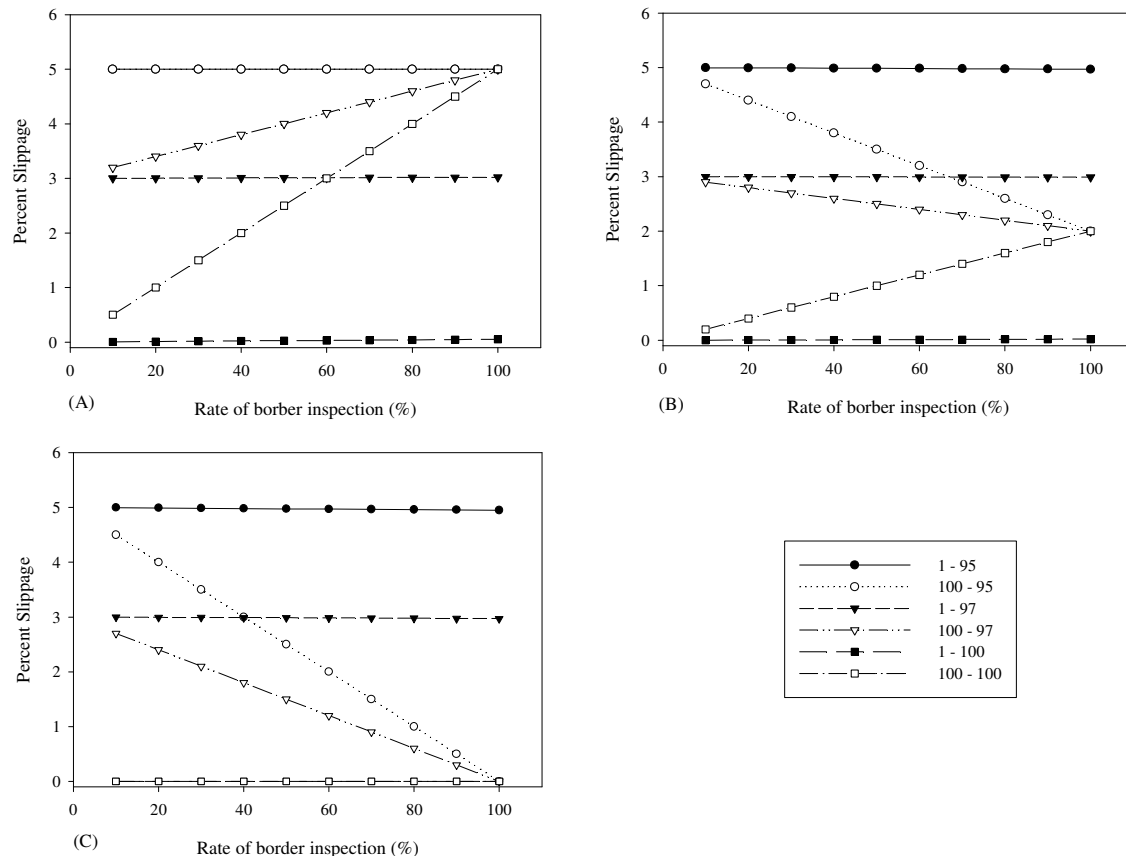
**Table 7.6** The effects that interacting inspection and treatment efficiencies had on total slippage when all vehicles were subject to compulsory inspection and treatment both pre-shipment and upon arriving in New Zealand. Shown in bold are the current inspection and treatment efficiencies.

Inspection Efficiency (%)	Treatment Efficiency (%)	Total slippage	% slippage	Total clean	% clean
100	100	0	0.00	181815	100
100	98	3636	2.00	178179	98
100	95	9091	5.00	172724	95
99	100	0	0.00	181815	100
99	98	3636	2.00	178179	98
99	95	9091	5.00	172724	95
98	100	0	0.00	181815	100
98	98	3636	2.00	178179	98
98	95	9091	5.00	172724	95
97	100	0	0.00	181815	100
<b>97</b>	<b>98</b>	<b>3636</b>	<b>2.00</b>	<b>178179</b>	<b>98</b>
97	95	9091	5.00	172724	95
96	100	0	0.00	181815	100
96	98	3636	2.00	178179	98
96	95	9091	5.00	172724	95
95	100	0	0.00	181815	100
95	98	3636	2.00	178179	98
95	95	9091	5.00	172724	95



**Figure 7.9** The effects that varying inspection and treatment efficiencies had on slippage when all used vehicles were inspected and treated pre-shipment and upon arriving in New Zealand (□ represents the current efficiencies)

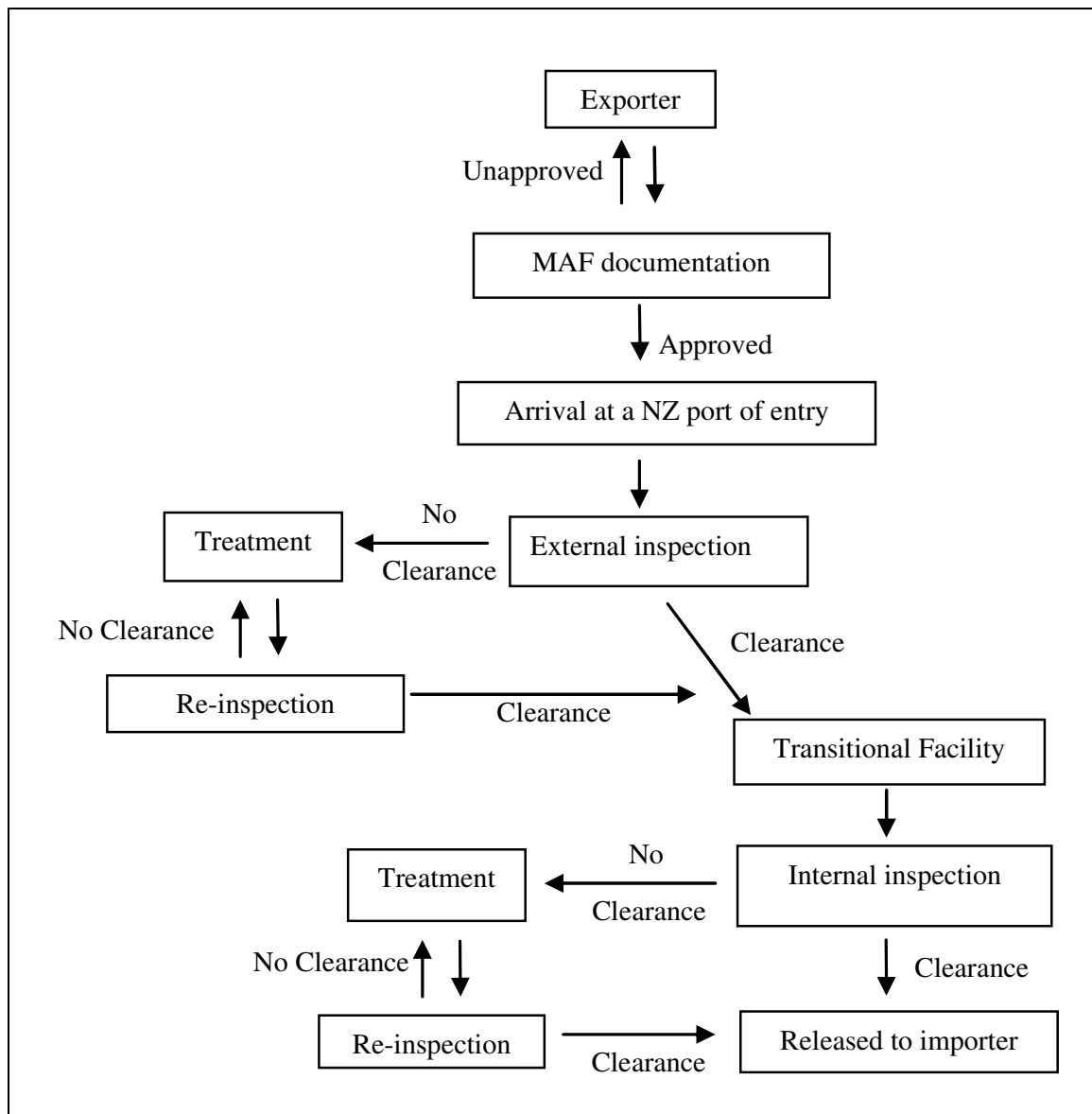
As varying pre-shipment management had no effect on total slippage, the proportion of vehicles inspected and treated upon arrival with all vehicles being subject to compulsory pre-shipment management was assessed. The interaction between the number of vehicles inspected and the number of vehicles treated upon arrival showed that increasing the proportion of vehicles inspected upon arriving in New Zealand had no effect on total slippage when 1% of vehicles are treated (current treatment rates) at all inspection and treatment efficiencies (Figure 7.10). However, slippage did decrease with increasing the proportion of vehicles treated to 100% for all inspection efficiencies less than 100% and all treatment efficiencies greater than 95%.



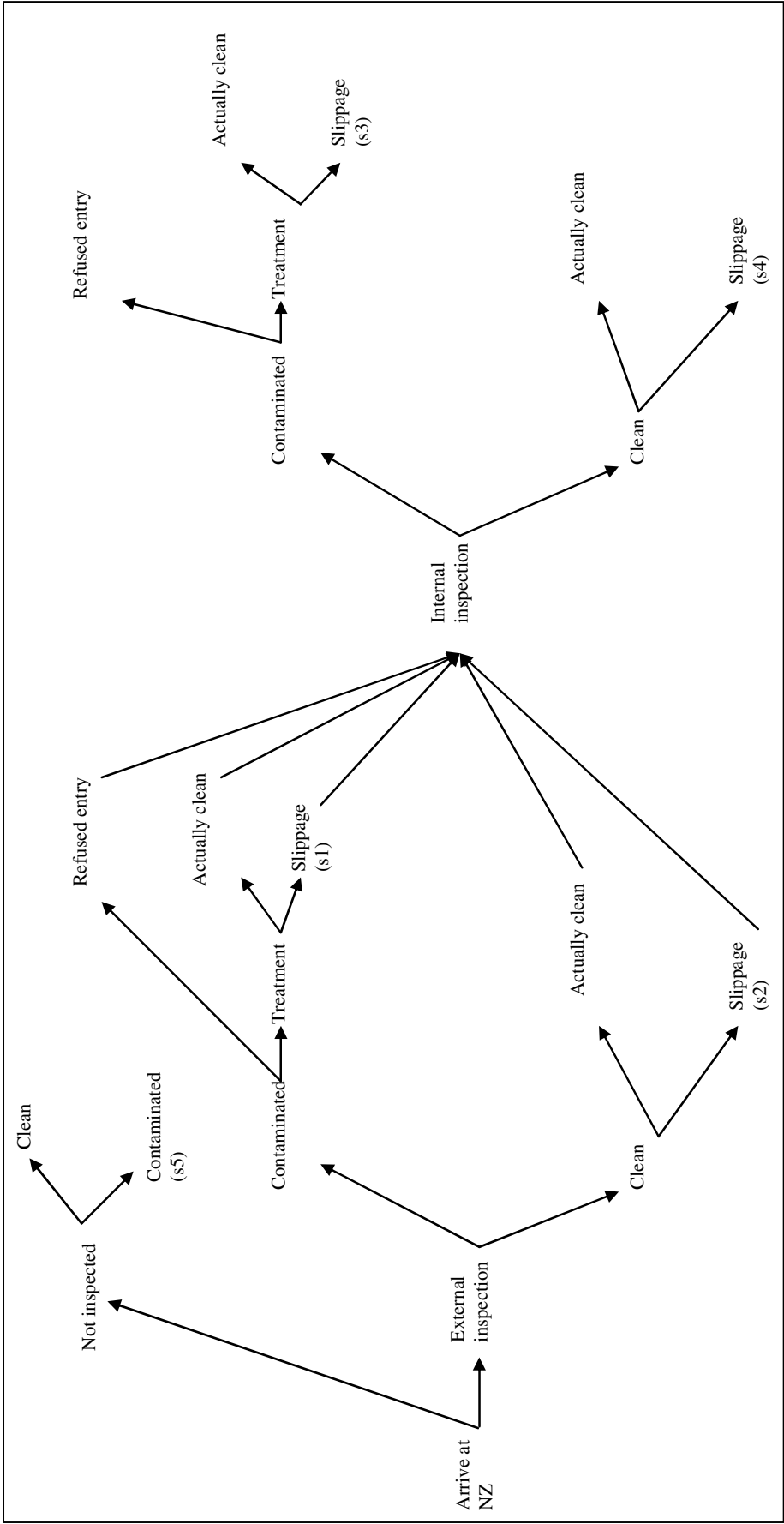
**Figure 7.10** The effect that compulsory pre-shipment inspection and treatment and varying the proportion of vehicles subject to inspection and treatment upon arriving in New Zealand for different inspection and treatment efficiencies has on total slippage. (A) 95% Treatment Efficiency, (B) 98% Treatment efficiency and (C) 100% Treatment efficiency. In the legend the 1 and 100 refers to the proportion of vehicles treated and the 95, 97 and 100 refer to the inspection efficiency.

### 7.3.2 The Sea Container Model

Sea containers are the means by which the majority of commodities of international trade are transported. The importation of containers, whether empty, full container load (FCL) or less than full container load (LCL), are subject to the MAF IHS for Sea Containers from All Countries (09 2003). Under these conditions, the sea container pathway (Figure 7.11) was modelled (Figure 7.12 and Table 7.7) in order to estimate the number of sea containers that entered New Zealand that were actually contaminated although they were given biosecurity clearance (for the equations used in this model see Appendix IV). However, it is important to note that cargo (whether commodities or packaging material) may be subject to specific import health standards separate from the IHS of the sea containers themselves, which were not included in this model.



**Figure 7.11** Diagrammatic representation of the importation of Sea Containers



**Figure 7.12** Diagrammatic representation of Sea Container model (For a detailed description of the model see Appendix II).

**Table 7.7** The legend for Figure 7.12. The decisions for the Sea container importation pathway model

Symbol	Decision	Current values (%)	Data source
A	The external inspection rate	100	Anon. 2003b
B	The proportion of containers contaminated (external)	4.2	Anon. 2003i
C	The proportion of contaminated containers that are treated (external)	99.9	Anon. Source 3, 2005
D	The level inspection efficiency (external)	97	Anon. 2003c
E	The treatment efficiency (external)	98	Anon. Source 3, 2006
a	The internal inspection rate	100	Anon. 2003b
b	The proportion of containers contaminated (internal)	20.7	Anon. 2003i
c	The proportion of contaminated containers that are treated (internal)	99.9	Anon. Source 3, 2005
d	The level of inspection efficiency (internal)	97	Anon. 2003c
e	The level of treatment efficiency (internal)	98	Anon. Source 3, 2006
T	Total number of imported sea containers		Anon. 2003i

**Decision: Status quo**

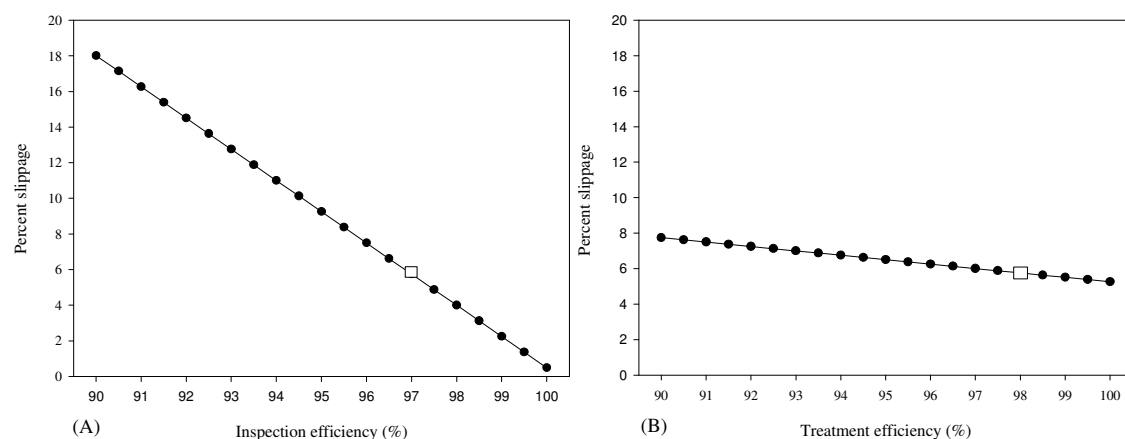
Based on the regulation in place in 2003 (Anon. 2003b), and on data from several other sources (Table 7.7) approximately 4.4% of containers entering New Zealand have some form of external contamination and 17.7% have some form of internal contamination (excluding contamination of commodities within containers) (Anon. 2003i). Under current regulations, 100% of sea containers entering New Zealand are inspected upon arrival and unloading at MAF approved facilities either on-wharf or off-wharf, irrespective of pre-shipment biosecurity management procedures (Anon. 2003b).

The model, under current procedures, estimated that 5.75% of containers (20759 containers) gained biosecurity clearance although they were actually contaminated (slippage) (Table 7.8). 2.96% (10686 containers) of all containers had some form of external contamination and 2.79% or 10072 containers had some form of internal contamination.

**Table 7.8** Total slippage of containers under current regulations predicted by the model.

	Total	Total Clean	% Clean	Total Slippage	% Slippage
External inspection	361000	350306		10678	
- clean	345835	335463	92.93	10375	2.87
- contaminated	15162	14843	4.11	303	0.09
Internal inspection	361000	350844		10081	
- clean	286273	277685	76.92	8588	2.38
- contaminated	74727	73159	20.27	1493	0.41
Total	361000			20759	5.75

Total slippage of containers per year under current conditions altered with varying inspection and treatment efficiencies (Figure 7.13). There was a decrease in slippage of 17.5% (63175 containers) if inspection efficiency is increased from 90% to 100%, in contrast, treatment efficiency only decreased slippage by 2.49% or 8988 containers per year. Inspection efficiency had a stronger influence on slippage, decreasing slippage by 1.75% (6318 containers) per year per percent increased (Table 7.9), whereas treatment efficiency only decreased slippage by less than 0.248% (895 containers) per year per percent increased.



**Figure 7.13** The effect that inspection (A) and treatment (B) efficiencies have separately on total slippage (□ represents the current efficiencies).

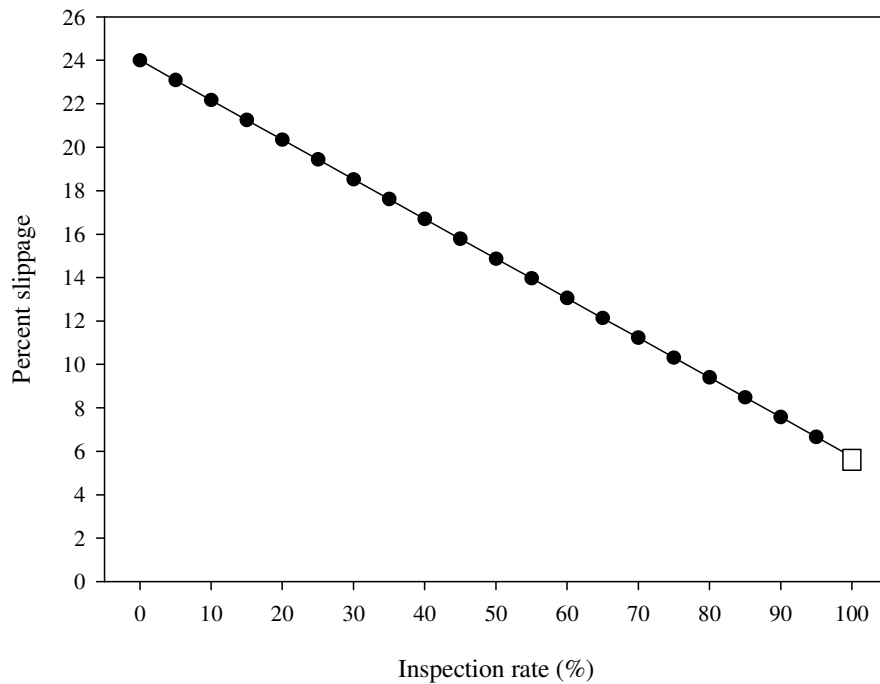
**Table 7.9** The effect of inspection and treatment efficiencies on total slippage under current regulations. Current efficiencies are in bold.

Inspection efficiency (%)	Treatment efficiency (%)	Total slippage	% Slippage	Total clean	% Clean
100	100	0	0.00	361000	100.00
100	98	1796	0.50	359204	99.50
100	95	4490	1.24	356510	98.76
99	100	6321	1.75	354679	98.25
99	98	8117	2.25	352883	97.75
99	95	10811	2.99	350189	97.01
98	100	12642	3.50	348358	96.50
98	98	14438	4.00	346562	96.00
98	95	17132	4.75	343868	95.25
97	100	18963	5.25	342037	94.75
<b>97</b>	<b>98</b>	<b>20759</b>	<b>5.75</b>	<b>340241</b>	<b>94.25</b>
97	95	23453	6.50	337547	93.50
96	100	25284	7.00	335716	93.00
96	98	27080	7.50	333920	92.50
96	95	29774	8.25	331226	91.75
95	100	31606	8.76	329394	91.25
95	98	33402	9.25	327598	90.75
95	95	36096	10.00	324904	90.00

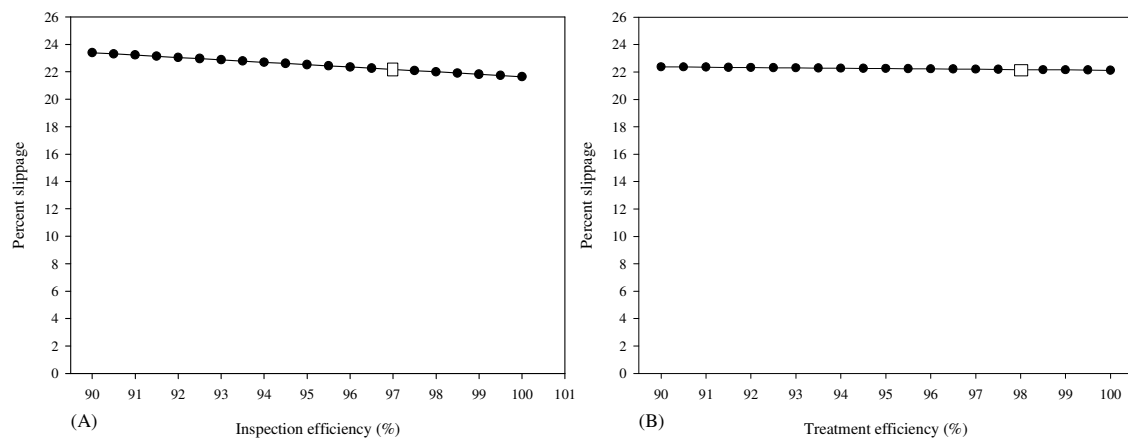
### Decision: Random inspection

Prior to 2003 approximately 10% of each consignment of sea containers entering New Zealand were inspected upon arrival (Anon. 2003i). Although this procedure has since been replaced with a 100% inspection regulation (Anon. 2003b), the effect of random 10% inspection per consignment was modelled. The model was used to assess the effect that inspection of containers upon arriving in New Zealand had on total slippage. Varying the proportion of containers that are inspected upon arrival had a strong effect of total slippage, with slippage decreasing by 18.25% (65,881 containers) from 24% to 5.75% when the proportion of containers inspected increased from 0 to 100% (Figure 7.14). Altering the inspection efficiency alone reduced slippage by 1.75% (6317 containers) when efficiency was increased from 90% to 100% (Figure 7.15), while increasing treatment efficiency decreased slippage by 0.25% (903 containers). Inspection efficiency had a stronger influence on slippage, decreasing slippage by 0.12% (433 containers) per year per percent increased (Table 7.10), while treatment efficiency only decreased slippage by 0.024% (87 containers) per year per percent increased.





**Figure 7.14** The effect of the proportion of containers inspected (inspection rate) on total slippage. (□ represents the current proportion)



**Figure 7.15** The effect that inspection (A) and treatment (B) efficiencies have on total slippage when containers are randomly selected for inspection. (□ represents the current efficiencies)

**Table 7.10** The effect inspection and treatment efficiency have on total slippage when containers are inspected randomly. Current efficiency rates are in bold.

Inspection Efficiency (%)	Treatment efficiency (%)	Total slippage	% Slippage	Total clean	% Clean
100	100	77976	21.60	283024	78.40
100	98	78156	21.65	282844	78.35
100	95	78425	21.72	282575	78.28
99	100	78608	21.78	282392	78.22
99	98	78788	21.82	282212	78.18
99	95	79057	21.90	281943	78.10
98	100	79240	21.95	281760	78.05
98	98	79420	22.00	281580	78.00
98	95	79689	22.07	281311	77.93
97	100	79872	22.13	281128	77.87
<b>97</b>	<b>98</b>	<b>80052</b>	<b>22.18</b>	<b>280948</b>	<b>77.82</b>
97	95	80321	22.25	280679	77.75
96	100	80504	22.30	280496	77.70
96	98	80684	22.35	280316	77.65
96	95	80953	22.42	280047	77.58
95	100	81137	22.48	279863	77.52
95	98	81316	22.53	279684	77.47
95	95	81586	22.60	279414	77.40

### 7.3.3 Woodpackaging and Bark

The model for simulating the woodpackaging pathway was developed in order to estimate the number of containers entering New Zealand which contain contaminated WP (Figure 7.16). The model incorporates all aspects of the importation which have a direct impact on the containers and their contents, including the possibility of consignments entering New Zealand without undergoing any biosecurity management procedures. The total numbers of containers entering New Zealand with contaminated WP were calculated by a series of equations (Appendix IV), with the associated policy and management decisions described in Table 7.11.

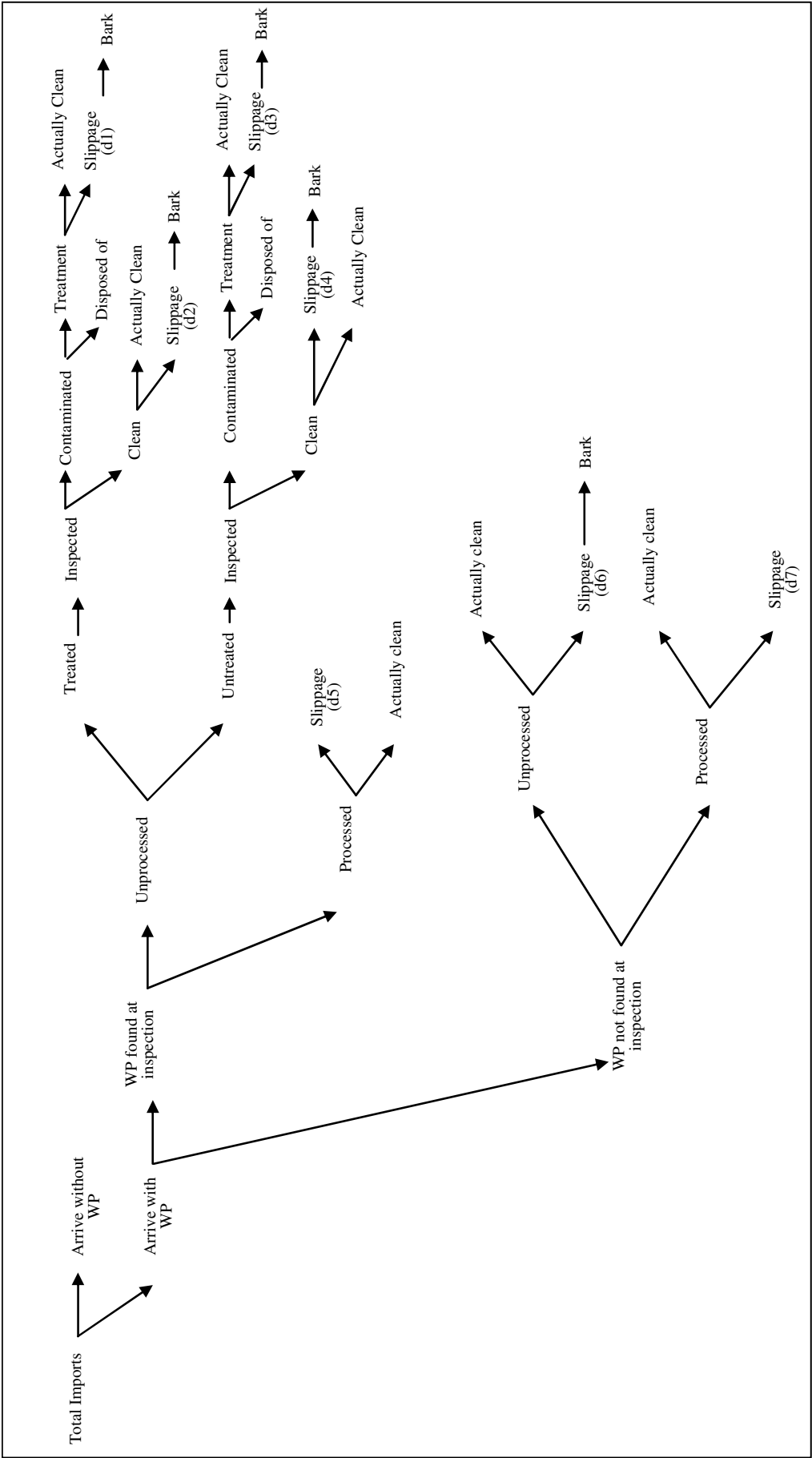


Figure 7.16 Diagrammatic representation of the Woodpackaging and bark pathway (For a detailed description of the model see Appendix II)

**Table 7.11** Legend for Figure 7.16. The decisions for the woodpackaging pathway model.

Symbol	Decision	Current values (%)	Data source
T	Total number of container entering New Zealand		{Anon., 2003 #20}
A	The proportion of total containers with woodpackaging	48	{Anon., 2003 #20}
B	The rate of detecting the presence of woodpackaging at inspection	53	{Anon., 2003 #20}
a1	The proportion of woodpackaging that is unprocessed and detected at inspection		Anon. Source 1 and 2, 2005
a2	The proportion of woodpackaging that is unprocessed not detected at inspection		Anon. Source 1 and 2, 2005
b	The rate of treated wooded		{Anon., 2005 #71}
c1	The rate of treatment of unprocessed woodpackaging		Anon. Source 1 and 2, 2005
c2	The rate of treatment of processed woodpackaging	97	Anon. Source 1 and 2, 2005
d	The rate of inspection efficiency	98	{Anon., 2003 #99}
e	The rate of treatment efficiency for unprocessed treated woodpackaging	98	Anon. Source 3, 2006
e2	The rate of treatment efficiency for unprocessed untreated woodpackaging		Anon. Source 3, 2006
ep	The rate of treatment efficiency of processed woodpackaging	99	Anon. Source 3, 2006
C	The proportion of woodpackaging that is contaminated and either disposed of or refused entry		{Anon., 2005 #71} Anon. Source 3, 2006
f	The proportion of containers with woodpackaging that are not inspected		Anon Source 3, 2006
Bark	The proportion of containers containing woodpackaging that are contaminated with Bark	11.8	{Bulman, 1998 #67}

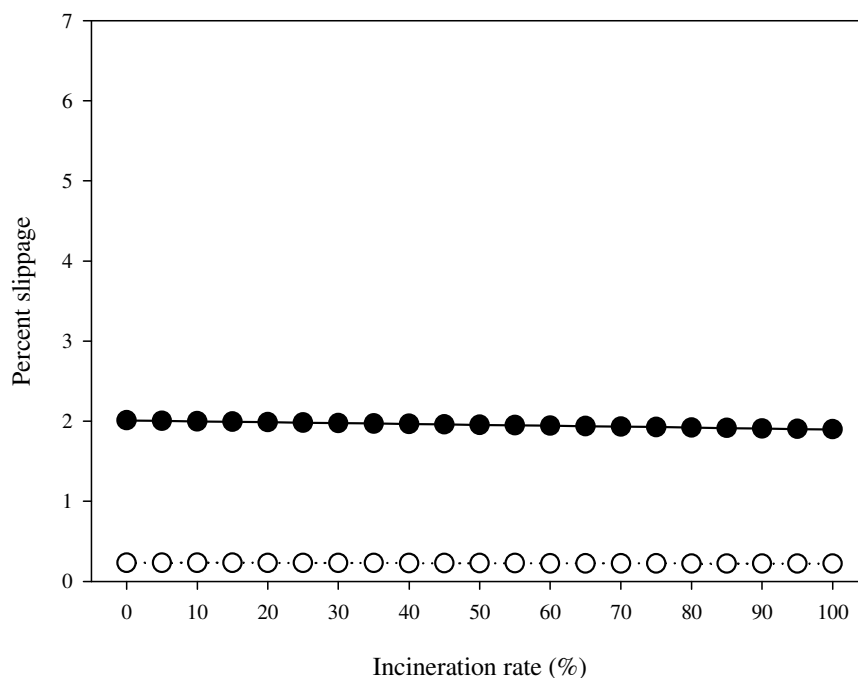
### Decision: Status quo

Approximately 49% of c. 500,000 containers entering New Zealand annually contain some form of woodpackaging (WP) (Anon. 2003i). As of 16<sup>th</sup> April 2003, the regulations for the importation of containers containing WP are outlined in IHS Woodpackaging Material from All Countries (Anon. 2003e). Currently it is strongly encouraged that WP be treated and come with certification prior to importation in accordance with international or New Zealand regulations (Anon. 2003e). Shipments without certification are treated as untreated WP and are dealt with accordingly. It is estimated that approximately 15.6% of all WP entering NZ requires biosecurity action of some description, more specifically, 11.6% of all containers with woodpackaging are contaminated with bark (Anon. 2003i).

The model estimated that under current conditions (Table 7.12) of the 175,697 sea containers that entered New Zealand in 2004 with WP, 2.20% (3873 containers) of those containers that passed border inspection were actually contaminated, with 0.25% (447 containers) containing woodpackaging contaminated with bark. Only 1.92% (3373 containers) of containers that were found to have no WP at inspection did contain contaminated WP. In contrast, only 0.24% (414 containers) of containers that were found to have contaminated WP which underwent biosecurity action remained contaminated, 0.03% (46 containers) of which were contaminated with bark. Varying the incineration rate (IR) of WP that is contaminated had a limited effect on over all slippage (Figure 7.17), only decreasing slippage by 0.113% (407 containers) per year and slippage associated with bark decreasing by 0.0131% (47 containers).

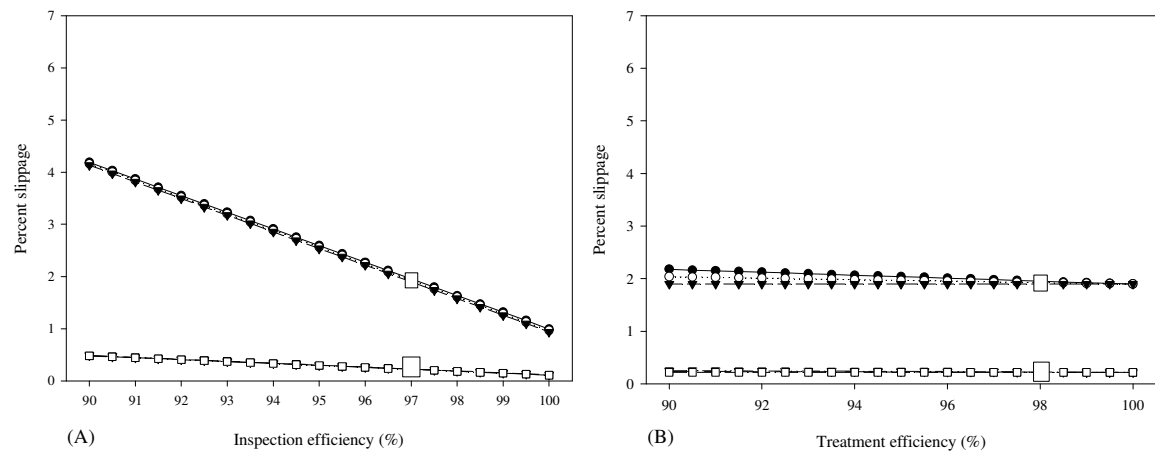
**Table 7.12** Total slippage rates of containers containing Woodpackaging material (WP) and woodpackaging material contaminated with bark (bark) imported into New Zealand under current conditions (bold represents the sum of containers with WP found at border and not found at the border).

	Total	Total Clean	% Clean	Total slippage	% Slippage	Total Bark	% Bark
Not found at inspection	24965	21592	12.29	3373	1.92	391	0.22
Found at inspection:	150719	146440	83.35	3873	2.20	447	0.25
- clean	130357	126898	72.23	3459	1.97	401	0.23
- contaminated	20362	19541	11.12	414	0.24	46	0.03
<b>Total</b>	<b>175684</b>	<b>168032</b>	<b>95.64</b>	<b>7246</b>	<b>4.12</b>	<b>839</b>	<b>0.477</b>



**Figure 7.17** The changes in slippage with changing the incineration rate of contaminated WP (●) and WP contaminated with bark (○)

Total slippage along this pathway under current regulations altered with varying inspection and treatment efficiencies. As inspection efficiency was increased from 90% to 100% there was a 3.19% (11516 containers) decrease in total WP slippage and a 0.37% (1336 containers) increases in slippage of bark. In contrast there was only a 0.14% (505 containers) decrease in WP slippage when treatment efficiency was increased from 90% to 100% (Figure 7.18) and a 0.016% (59 containers) decrease in bark slippage, irrespective of IR. However, with varying treatment efficiency, IR had a stronger though still limited effect; at 90% treatment efficiency increasing IR from 50% to 100% decreased WP slippage by 0.28% (1011 containers) and bark slippage by 0.033% (118 containers). The interaction between inspection and treatment efficiencies showed that inspection efficiency had an influence on total slippage, decreasing WP slippage by 0.32% (1155 containers) and bark slippage by 0.033% (118 containers) per year per percent efficiency increased, irrespective of IR (Table 7.13). Treatment efficiency only had an influence on slippage when IR was below 100%, decreasing slippage by less than 0.028% (101 containers) per year per efficiency percent increased.



**Figure 7.18** Changes in total slippage with changing inspection (A) and treatment (B) efficiencies. (□ represents the current efficiencies) (Solid symbols refers to WP and empty symbols refers to bark)

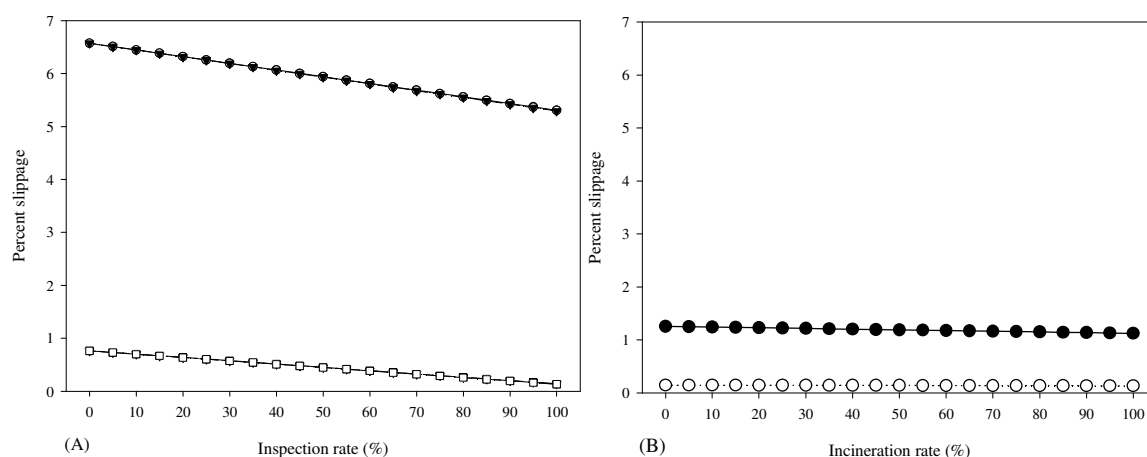
**Table 7.13** The changes in slippage with varying inspection and treatment efficiencies and varying IR. Current efficiencies are displayed in bold. Bark slippage is in brackets.

Inspection efficiency (%)	Treatment efficiency (%)	50% IR		75% IR		100% IR	
		Total	%	Total	%	Total	%
100	100	3388 (391)	0.94 (0.108)	3388 (391)	0.94 (0.108)	3388 (391)	0.94 (0.108)
100	98	3591 (415)	0.99 (0.115)	3490 (403)	1.02 (0.112)	3388 (391)	1.05 (0.108)
100	95	3896 (450)	1.08 (0.125)	3642 (420)	1.15 (0.116)	3388 (391)	1.22 (0.108)
99	100	4541 (525)	1.26 (0.145)	4541 (525)	1.26 (0.145)	4541 (525)	1.26 (0.145)
99	98	4744 (548)	1.31 (0.152)	4643 (536)	1.34 (0.149)	4541 (525)	1.37 (0.145)
99	95	5049 (584)	1.40 (0.1620)	4795 (554)	1.47 (0.154)	4541 (525)	1.54 (0.145)
98	100	5694 (658)	1.58 (0.182)	5694 (658)	1.58 (0.182)	5694 (658)	1.58 (0.182)
98	98	5897 (682)	1.63 (0.189)	5796 (670)	1.66 (0.186)	5694 (658)	1.69 (0.182)
98	95	6202 (717)	1.72 (0.199)	5948 (688)	1.79 (0.191)	5694 (658)	1.86 (0.182)
97	100	6847 (792)	1.90 (0.219)	6847 (792)	1.90 (0.219)	6847 (792)	1.90 (0.219)
<b>97</b>	<b>98</b>	<b>7050 (816)</b>	<b>1.95 (0.226)</b>	<b>6949 (804)</b>	<b>1.98 (0.223)</b>	<b>6847 (792)</b>	<b>2.01 (0.219)</b>
97	95	7355 (851)	2.04 (0.236)	7101 (822)	2.11 (0.228)	6847 (792)	2.18 (0.219)
96	100	8000 (926)	2.22 (0.256)	8000 (926)	2.22 (0.256)	8000 (926)	2.22 (0.256)
96	98	8203 (950)	2.27 (0.263)	8102 (938)	2.30 (0.260)	8000 (926)	2.33 (0.256)
96	95	8509 (985)	2.36 (0.273)	8254 (955)	2.43 (0.265)	8000 (926)	2.50 (0.256)
95	100	9153 (1060)	2.54 (0.294)	9153 (1060)	2.54 (0.294)	9153 (1060)	2.54 (0.294)
95	98	9356 (1086)	2.59 (0.300)	9255 (1071)	2.62 (0.297)	9153 (1060)	2.65 (0.294)
95	95	9662 (1119)	2.68 (0.310)	9407 (1089)	2.75 (0.302)	9153 (1060)	2.82 (0.294)

### Decision: Compulsory full inspection at border

As only 85% of WP is detected at the initial inspection (usually a door inspection), in order to reduce the risks associated with WP, the model assessed the effect of compulsory full initial inspection of containers, which increases the likelihood of the

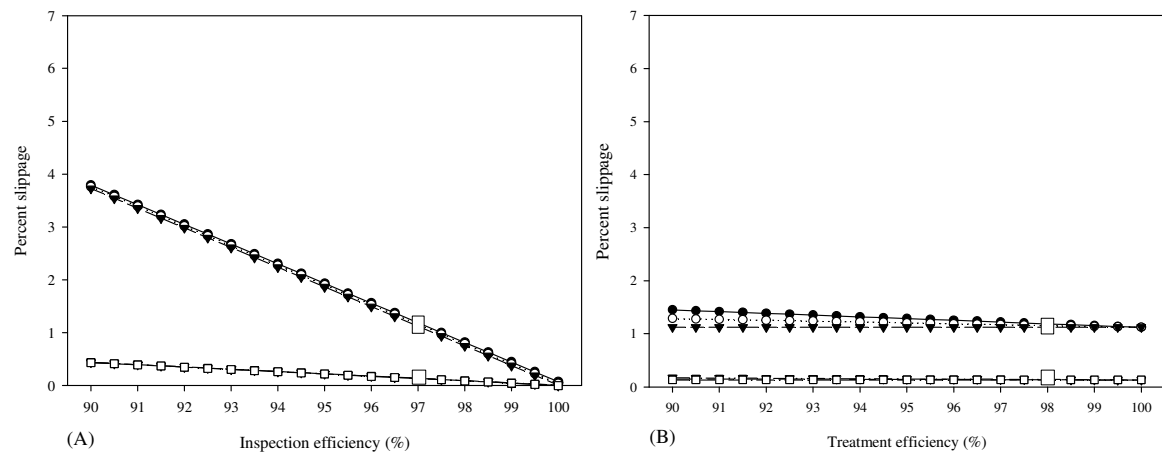
WP being detected to 100%. This initial detection rate of WP is referred to as the border inspection rate. Increasing the border inspection rate alone decreased total WP slippage by 1.27% (4585 containers) and bark slippage by 0.63% (2274 containers) per year as inspection rate increased from 0% to 100% (Figure 7.19). The IR had a limited effect on total slippage, only reducing WP slippage by 0.13% (469 containers) and bark slippage by 0.015% (55 containers) per year when increased from 0% to 100%.



**Figure 7.19** The effect of varying the proportion of containers inspected at the border (A) and incineration rate (B) on total slippage for WP (closed symbols) and Bark (open symbols).

Total slippage of containers containing contaminated WP per year altered with varying inspection and treatment efficiencies when all containers arriving undergo compulsory full initial inspection. As inspection efficiency increases from 90% to 100% there was a 3.72% (13429 containers) decrease in overall WP slippage per year and a 0.43% (1559 containers) decreased in bark slippage, irrespective of IR (Figure 7.20). In contrast, treatment efficiency reduced WP and bark slippage by less than 0.23% (830 containers) and 0.038% (138 containers) per year (respectively) at an IR of 50%, while treatment efficiency had no effect on slippage with an IR of 100%. The interactions between inspection and treatment efficiencies showed that inspection efficiency had the stronger influence on total slippage, decreasing WP slippage by 0.37% (1336 containers) per year and bark slippage by 0.043% (312 containers) per percent efficiency increased, irrespective of IR (Table 7.14). In contrast, treatment decreased slippage by less than 0.033% (119 containers) per year per percent efficiency increase at 50% IR, reducing down to no influence at 100% IR.





**Figure 7.20** Changes in slippage at compulsory border inspection with varying inspection and treatment efficiencies. (□ represents the current efficiencies).

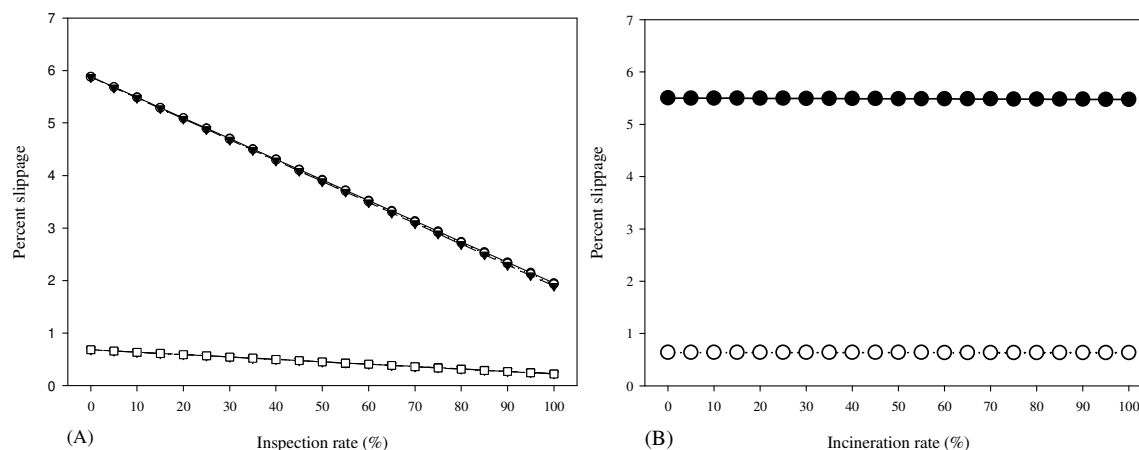
**Table 7.14** Comparison of the changes in slippage between current and compulsory border inspection for varying inspection and treatment efficiencies. Bold represents the current efficiencies. Bark slippage rates are in Brackets

Inspection efficiency (%)	Treatment efficiency (%)	85% inspection rate			100% inspection rate		
		50% IR (%)	75% IR (%)	100% IR (%)	50% IR (%)	75% IR (%)	100% IR (%)
100	100	0.94 (0.1080)	0.94 (0.108)	0.94 (0.108)	0.005 (0.000)	0.005 (0.000)	0.005 (0.000)
100	98	0.99 (0.115)	0.97 (0.112)	0.94 (0.108)	0.071 (0.008)	0.038 (0.004)	0.005 (0.000)
100	95	1.08 (0.125)	1.01 (0.116)	0.94 (0.108)	0.169 (0.019)	0.087 (0.010)	0.005 (0.000)
99	100	1.26 (0.145)	1.26 (0.145)	1.26 (0.145)	0.377 (0.043)	0.377 (0.043)	0.377 (0.043)
99	98	1.31 (0.152)	1.29 (0.149)	1.26 (0.145)	0.443 (0.051)	0.410 (0.047)	0.377 (0.043)
99	95	1.40 (0.162)	1.33 (0.154)	1.26 (0.145)	0.541 (0.062)	0.459 (0.053)	0.377 (0.043)
98	100	1.58 (0.182)	1.58 (0.182)	1.58 (0.182)	0.749 (0.086)	0.749 (0.086)	0.749 (0.086)
98	98	1.63 (0.189)	1.61 (0.186)	1.58 (0.182)	0.815 (0.094)	0.782 (0.090)	0.749 (0.086)
98	95	1.72 (0.199)	1.65 (0.191)	1.58 (0.182)	0.914 (0.105)	0.832 (0.096)	0.749 (0.086)
97	100	1.90 (0.219)	1.90 (0.219)	1.90 (0.219)	1.122 (0.130)	1.122 (0.130)	1.122 (0.130)
<b>97</b>	<b>98</b>	<b>1.95 (0.226)</b>	<b>1.92 (0.223)</b>	<b>1.90 (0.219)</b>	<b>1.187 (0.137)</b>	<b>1.155 (0.133)</b>	<b>1.122 (0.130)</b>
97	95	2.04 (0.236)	1.97 (0.228)	1.90 (0.219)	1.286 (0.149)	1.204 (0.139)	1.122 (0.130)
96	100	2.22 (0.256)	2.22 (0.256)	2.22 (0.256)	1.494 (0.173)	1.494 (0.173)	1.494 (0.173)
96	98	2.27 (0.263)	2.24 (0.260)	2.22 (0.256)	1.560 (0.180)	1.527 (0.177)	1.494 (0.173)
96	95	2.36 (0.273)	2.29 (0.265)	2.22 (0.256)	1.658 (0.192)	1.576 (0.182)	1.494 (0.173)
95	100	2.54 (0.294)	2.54 (0.294)	2.54 (0.294)	1.866 (0.216)	1.866 (0.216)	1.866 (0.216)
95	98	2.59 (0.300)	2.56 (0.297)	2.54 (0.294)	1.932 (0.224)	1.899 (0.220)	1.866 (0.216)
95	95	2.68 (0.310)	2.61 (0.302)	2.54 (0.294)	2.031 (0.235)	1.948 (0.225)	1.866 (0.216)

### Decision: Random inspection of WP with ISO 15 stamp

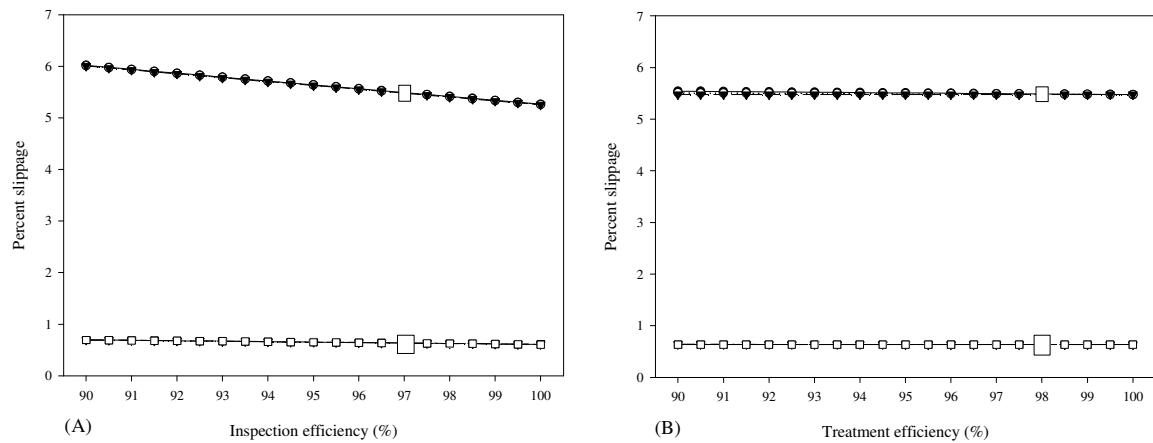
New Zealand has implemented the ISPM 15 standard for woodpackaging, thereby WP known to have ISPM 15 marked WP was considered to have a lower risk potential and underwent limited biosecurity management at the border. In order to assess the effect that altering the importation procedures of containers with WP known to have

the ISOM 15 mark has on slippage, the proportion of containers containing known ISPM 15 WP was varied (Figure 7.21(A)). As the proportion of containers inspected increased from 0% to 100% there was a 3.95% (14079 containers) decrease in total WP slippage and a 0.46% (1665 containers) decrease in bark slippage, irrespective of IR. Increasing IR only decreased total WP slippage by 0.0265% (96 containers) and bark slippage by 0.0031% (11 containers) per year (Figure 7.21(B)).



**Figure 7.21** Effects of varying the inspection rate of containers with known ISPM 15 WP (A) and varying IR (B) on total slippage.

Total slippage when there is a random inspection of containers with known ISPM 15 WP altered with varying inspection and treatment efficiencies (Figure 7.22). As inspection alone increased from 90% to 100% there was a 0.75% (2708 containers) decrease in total WP slippage and a 0.087% (314 containers) decrease in bark slippage, irrespective of IR. An increase in treatment efficiency only decreased total WP and bark slippage by 0.066% (238 containers) and 0.0077% (28 containers) (respectively) per year; again IR had a very limited effect on slippage. This indicated that inspection efficiency has a stronger influence on slippage (decreasing WP and bark slippage by 0.075% (275 containers) and 0.01% (28 containers) respectively per year per percent increased) than treatment efficiency, which only decreased WP slippage by 0.0066% or 24 containers and bark slippage by 0.008% or 3 containers per year per percent increased at IR less than 100% (Table 7.15).



**Figure 7.22** Changes in slippage with random inspection of containers with known WP with the ISO 15 marked and varying inspection and treatment efficiencies. (□ represents the current efficiencies) (Solid symbols refers to WP and empty symbols refers to bark)

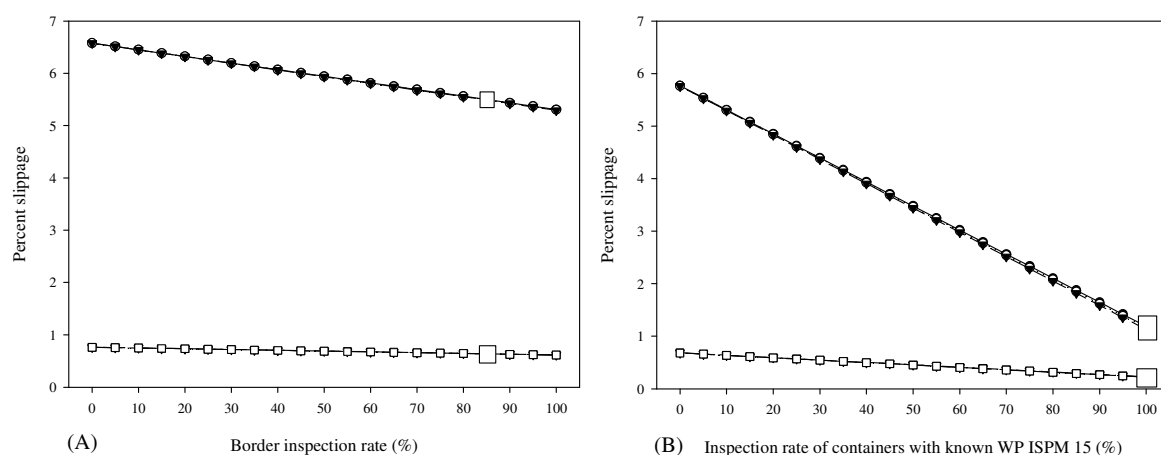
**Table 7.15** Changes in slippage with random inspection of containers with known ISO 15 marked and varying inspection and treatment efficiencies. (Bold represents the current efficiencies) Bark slippage is in brackets

Inspection Efficiency (%)	Treatment efficiency (%)	50% IR		75% IR		100% IR	
		Total	%	Total	%	Total	%
100	100	18953 (2105)	5.250 (0.583)	18953 (2105)	5.250 (0.583)	18953 (2105)	5.250 (0.583)
100	98	19001 (2111)	5.263 (0.585)	18977 (2108)	5.257 (0.584)	18953 (2105)	5.250 (0.583)
100	95	19073 (2121)	5.283 (0.587)	19013 (2113)	5.267 (0.585)	18953 (2105)	5.250 (0.583)
99	100	19224 (2141)	5.325 (0.593)	19224 (2141)	5.325 (0.593)	19224 (2141)	5.325 (0.593)
99	98	19272 (2148)	5.339 (0.595)	19248 (2145)	5.332 (0.594)	19224 (2141)	5.325 (0.593)
99	95	19344 (2157)	5.358 (0.598)	19284 (2149)	5.342 (0.595)	19224 (2141)	5.325 (0.593)
98	100	19495 (2178)	5.400 (0.603)	19495 (2178)	5.400 (0.603)	19495 (2178)	5.400 (0.603)
98	98	19543 (2184)	5.414 (0.605)	19519 (2181)	5.407 (0.604)	19495 (2178)	5.400 (0.603)
98	95	19615 (2194)	5.433 (0.608)	19555 (2186)	5.417 (0.606)	19495 (2178)	5.400 (0.603)
97	100	19766 (2215)	5.475 (0.613)	19766 (2215)	5.475 (0.613)	19766 (2215)	5.475 (0.613)
<b>97</b>	<b>98</b>	<b>19814 (2221)</b>	<b>5.489 (0.615)</b>	<b>19790 (2218)</b>	<b>5.482 (0.614)</b>	<b>19766 (2215)</b>	<b>5.475 (0.613)</b>
97	95	19886 (2231)	5.509 (0.618)	19826 (2223)	5.492 (0.616)	19766 (2215)	5.475 (0.613)
96	100	20037 (2251)	5.550 (0.624)	20037 (2251)	5.550 (0.624)	20037 (2251)	5.550 (0.624)
96	98	20085 (2258)	5.564 (0.625)	20061 (2254)	5.557 (0.625)	20037 (2251)	5.550 (0.624)
96	95	20157 (2267)	5.584 (0.628)	20097 (2259)	5.567 (0.626)	20037 (2251)	5.550 (0.624)
95	100	20308 (2288)	5.626 (0.634)	20308 (2288)	5.626 (0.634)	20308 (2288)	5.626 (0.634)
95	98	20356 (2294)	5.639 (0.636)	20332 (2291)	5.632 (0.635)	20308 (2288)	5.626 (0.634)
95	95	20428 (2304)	5.659 (0.638)	20368 (2296)	5.642 (0.636)	20308 (2288)	5.626 (0.634)

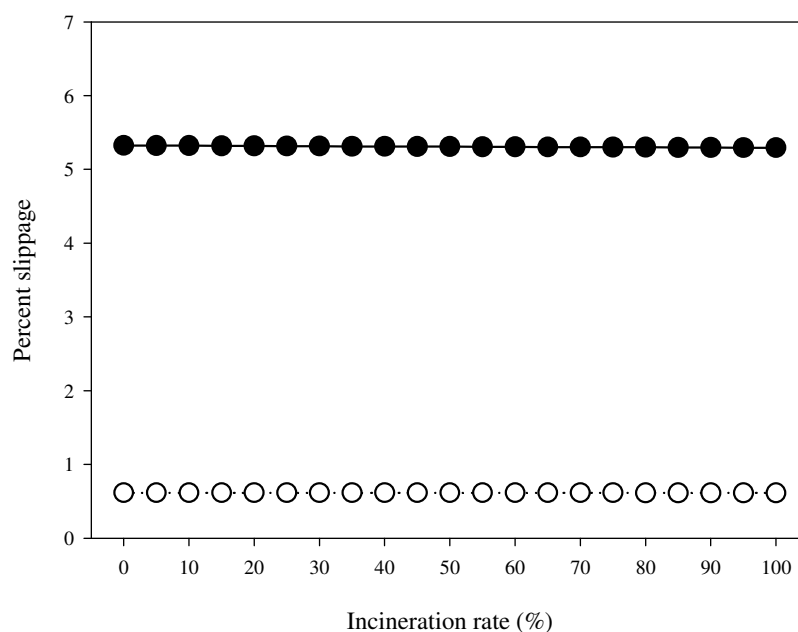
### Decision: Random inspection of containers with known WP with the ISPM 15 mark and compulsory border inspection

In order to further reduce the risk potential associated with the importation of WP, the model assessed the effect of compulsory full border inspection of containers and a further random inspection of containers with known ISPM 15 WP material on total slippage. Increasing border inspection rate from 0% to 100% in conjunction with

random inspections of containers with known ISPM 15 WP decreased total WP slippage by 1.27% (4585 containers) and bark slippage by 0.15% (536 containers) per year (Figure 7.23), while increasing inspection rate of containers with known ISPM 15 WP in conjunction with compulsory full border inspections decreased WP slippage by 4.61% (16642 containers) and bark slippage by 0.46% (1665 containers) per year. IR had a very limited effect on total slippage (Figure 7.24), decreasing WP slippage by only 0.03% (112 containers) and bark slippage by 0.0035% (13 containers) per year when increased from 0% to 100%.

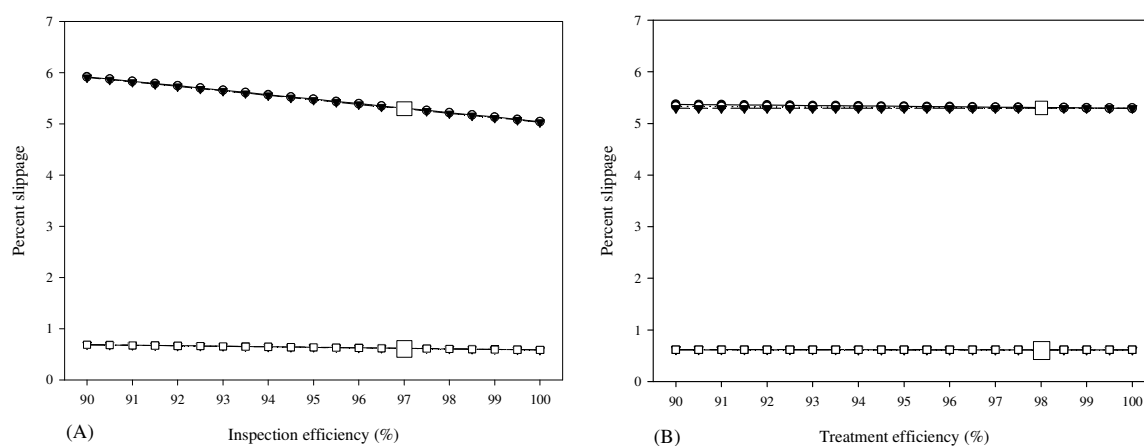


**Figure 7.23** Effect of varying full border inspection rate (A) and the proportion of containers inspected with known ISPM 15 WP (B) has on total slippage. (□ represent current rates). Solid symbols refers to WP and empty symbols refers to bark)



**Figure 7.24** The effect of the proportion of containers with contaminated WP either disposed of (incineration) or refused entry into New Zealand. (Solid symbols refers to WP and empty symbols refers to bark)

Total slippage of containers containing contaminated WP, (when all FCL containers undergo full inspection at border and containers with known ISPM 15 WP undergo further random inspection), altered with varying inspection and treatment efficiencies (Figure 7.25). As inspection efficiency alone increased from 90% to 100%, total WP slippage decreased by 0.875% (3158 containers) and bark slippage by 0.10% (366 containers) per year, irrespective of IR. In contrast, treatment efficiency had a lesser impact, decreasing WP slippage by only 0.0397% (143 containers per year) and bark slippage by 0.009% (32 containers) per year. This indicates that inspection efficiency had a limited influence on total slippage, decreasing WP and bark slippage by only 0.088% (318 containers) and 0.0087% (31 containers) respectively per year per percent increased (Table 7.16). However, treatment efficiency had an even weaker influence, only decreasing WP slippage by 0.038% or 137 containers and bark slippage by no more than 0.0008% (3 containers) per year per percent increased.



**Figure 7.25** The changes in slippage with random inspection of containers with known WP with the ISO 15 mark and with compulsory border inspection at varying inspection and treatment efficiencies. (□ represents the current efficiencies) (Solid symbols refers to WP and empty symbols refers to bark)

**Table 7.16** Changes in slippage with compulsory border inspection and random inspection of containers with known WP ISO 15 marked with varying inspection and treatment efficiencies separately. Current efficiencies are in bold. Bark slippage is in brackets

Inspection Efficiency (%)	Treatment efficiency (%)	50% IR		75% IR		100% IR	
		Total	%	Total	%	Total	%
100	100	18161 (2197)	5.031 (0.608)	18161 (2197)	5.031 (0.608)	18161 (2197)	5.031 (0.609)
100	98	18217 (2202)	5.046 (0.610)	18189 (2199)	5.039 (0.609)	18161 (2197)	5.031 (0.609)
100	95	18301 (2210)	5.069 (0.612)	18231 (2203)	5.050 (0.610)	18161 (2197)	5.031 (0.609)
99	100	18477 (2228)	5.118 (0.617)	18477 (2228)	5.118 (0.617)	18477 (2228)	5.118 (0.617)
99	98	18533 (2234)	5.134 (0.619)	18505 (2231)	5.126 (0.618)	18477 (2228)	5.118 (0.617)
99	95	18617 (2242)	5.157 (0.621)	18547 (2235)	5.138 (0.619)	18477 (2228)	5.118 (0.617)
98	100	18793 (2259)	5.206 (0.626)	18793 (2259)	5.206 (0.626)	18793 (2259)	5.206 (0.626)
98	98	18849 (2265)	5.221 (0.627)	18821 (2262)	5.214 (0.627)	18793 (2259)	5.206 (0.626)
98	95	18932 (2273)	5.244 (0.630)	18863 (2266)	5.225 (0.628)	18793 (2259)	5.206 (0.626)
97	100	19109 (2291)	5.293 (0.635)	19109 (2291)	5.293 (0.635)	19109 (2291)	5.293 (0.635)
<b>97</b>	<b>98</b>	<b>19165 (2296)</b>	<b>5.309 (0.636)</b>	<b>19137 (2294)</b>	<b>5.301 (0.635)</b>	<b>19109 (2291)</b>	<b>5.293 (0.635)</b>
97	95	19248 (2305)	5.332 (0.638)	19179 (2298)	5.313 (0.637)	19109 (2291)	5.293 (0.635)
96	100	19425 (2322)	5.381 (0.643)	19425 (2322)	5.381 (0.643)	19425 (2322)	5.381 (0.643)
96	98	19480 (2328)	5.396 (0.645)	19453 (2325)	5.389 (0.644)	19425 (2322)	5.381 (0.643)
96	95	19564 (2336)	5.419 (0.647)	19494 (2329)	5.400 (0.645)	19425 (2322)	5.381 (0.643)
95	100	19741 (2354)	5.468 (0.652)	19741 (2354)	5.468 (0.652)	19741 (2354)	5.468 (0.652)
95	98	19796 (2359)	5.484 (0.654)	19768 (2356)	5.476 (0.653)	19741 (2354)	5.468 (0.652)
95	95	19880 (2368)	5.507 (0.656)	19810 (2361)	5.488 (0.654)	19741 (2354)	5.468 (0.652)

## 7.4 Discussion

The contamination of used vehicles, sea containers and their contents are major biosecurity risks to transit ports and importing nations. These risks have the potential to have a severe negative impact on a nation's environment, health and economic productivity. As mentioned in Chapter 2, only contaminants that are considered a biosecurity risk and are not detected at the border have the potential to negatively impact any importing nation. As such, contaminants that have gone undetected by border management procedures (slippage) are of most concern.

### Management and Policy decisions

The importation of used vehicles, sea containers and woodpacking (including bark) follow the same general importation pathways and biosecurity management procedures, thereby enabling a comparison of the effects that altering each border management procedure had on slippage.

### **Pre-shipment Inspection and Treatment**

To reduce biosecurity risks entering New Zealand, MAF encourages pre-shipment management of commodities and vessels imported into New Zealand (Anon. 2003i, e, d, 2005). Pre-shipment inspection and treatment must be conducted within a given number of days prior to shipment, and conform to specific instructions for storage after inspection and treatment until shipping as outlined in relevant IHS (Anon. 2001b, 2003b, d). Evidence suggests that pre-shipment management of commodities and vessels reduces the spread of unwanted pest and organisms, thereby permitting a reduction of inspections and other procedures upon arrival at the port of destination (Anon. 2005) (Stanaway *et al.* 2001, Anon. 2003i, Nendick and Sarty 2006). This reduction in inspection and other biosecurity measures leads to a reduction in the cost of the compliance, as each inspection and the possible subsequent treatments are an added cost to the importer (exacerbators) in addition to the costs of the ‘down time’ these procedures incur (see Chapters 5 and 8).

The effect of pre-shipment management on slippage along the used vehicle importation pathway was simulated based on information from several sources. Pre-shipment inspection and treatment requires used vehicles to be inspected and treated in a manner that complies with the IHS for Treated Used Vehicles Imported into New Zealand and consignments to be accompanied by appropriate documentation. Increasing the proportion of used vehicles undergoing pre-shipment inspection from 0% to 100% increased slippage by 1.36% per year. This increased slippage rate could result from the re-contamination of the vehicles in the period from inspection or treatment to unloading at their final destination (Anon. 2005, Nendick and Sarty 2006), and/or from inaccurate inspection (Anon. 2003i) and treatment. This undetected contamination or potential recontamination is compounded with the reduced inspection rate (and subsequent treatment when required) of used vehicles with pre-shipment inspection and treatment.

Pre-shipment inspection and treatment of WP material requires the WP material being used to be treated and marked in a specific manner (generally ISPM 15 mark) prior to the loading of containers. The model estimated that increasing the proportion of containers containing manifested marked WP, which have accompanying certificates

increased slippage by 1.36% per year. This was based on the assumption that WP with the ISPM 15 mark had been treated and inspected within the regulations outlined in the ISPM 15 standard and was therefore less likely to be contaminated, thereby enabling a reduction in inspection and subsequent treatments upon arrival in New Zealand. As with the used vehicles, the increased slippage rate can be attributed to either re-contamination en-route or inadequate inspection and treatment or both (Anon. 2003i). Recent studies have shown that, as ISPM 15 treatment is aimed at killing organisms that reside in the wood at the time of treatment but does not require elimination of bark, bark and wooding infesting insects of quarantine significance can re-infest and successfully reproduce in logs and boards with residual bark after ISPM 15 treatment (Haack 2006, Haack and Petrice 2009). In addition, Haack and Petrice (2009) contended that there may be other factors contributing to the re-infestation of ISPM 15 woodpackaging, including the possibility that the ISPM 15 prescribed treatment may be insufficient in killing all insects and that some treatments are improperly applied (whether knowingly or as a result of faulty equipment or facilities). Despite these findings, Haack and Petrice (2009) concluded that even if some insects of quarantine significance were introduced via ISPM 15-compliant woodpackaging material, arriving insects populations are likely to be relatively small and thus hard to detect.

For both used vehicles and woodpackaging, consignments that have undergone pre-shipment inspection and treatment undergo different border procedures upon arrival in New Zealand than those that have no pre-shipment management. All consignments of both used vehicle and woodpackaging that have not undergone any pre-shipment procedures or where accompanying documentation did not meet IHS requirements, are required to undergo full inspection and treatment (where necessary) irrespective of origin (Anon. 2003e, c). In contrast, used vehicles that have had pre-shipment inspection and treatment are subject to a random inspection of 10% of each consignment and containers known to contain woodpackaging marked with the ISPM 15 mark are to be inspected 'where possible' (Anon. 2003c). These reductions in inspections and subsequent treatment rates are aimed at reducing the cost to the importer and the down time of containers and vehicles. This study has shown that a reduction in border inspections, although aimed at facilitating trade, increases the



slippage along the used vehicle and WP importation pathways and increases the risk of invasive species entering and establishing within New Zealand.

In contrast, there are currently no pre-shipment requirements for the sea containers themselves, consequential all sea containers themselves are treated in the same manner upon arriving in New Zealand.

### **Border Inspection**

To prevent the importation of unwanted pests and organisms, MAF regulations require commodities and vessels under the Section 22 of the BSA (1993) to meet regulations in the applicable IHS to the satisfaction of MAF officials before being imported into New Zealand. All imports are required to be accompanied by the appropriate documentation (see Chapter 6) and are subject to either random or compulsory inspections upon arriving in New Zealand. These inspections are conducted on the wharf or off the wharf at a MAF approved transitional facility (see Chapter 5) by either a MAF accredited person or a MAF inspector. Evidence shows that border inspections are very successful at detecting biosecurity risks (Anon. 2006d) and that any unwanted pest or organism that goes undetected by the border inspections has the potential of establishing and having severe implications for our environment (Nendick and Sarty 2006).

### **Inspection efficiency**

As inspection was shown to have the most influence on overall slippage along all three importation pathway, the accuracy of the inspection or inspection efficiency had the strongest influence on slippage.

### **Used Vehicles**

The model for the vehicle pathways estimated that under current management procedures 1.63% of all used vehicles entering New Zealand annually are deemed clean but are in fact contaminated. Although altering any one of the management procedures in place did have an effect on slippage, altering efficiencies of the systems already in place had the greatest effect on the overall slippage rate, of which

inspection efficiency had the strongest influence. Whereby increasing the inspection efficiency from the estimated to 100% (Table 7.6) decreased the slippage by 99.9% from 2964 vehicles annually to 2 (Table 7.17).

### Sea Containers

The sea container model estimated that under current regulations 5.75% of containers are given biosecurity clearance and enter New Zealand each year although they are contaminated. Although altering each of the procedures reduced slippage, increasing inspection efficiency under current regulations had the strongest influence on slippage (Table 7.9), without altering any other management procedures. Whereby increasing the inspection from the current rate of 97% to 100% slippage decreased by 91% from 20,756 containers annually to 1796 containers (Table 7.17).

### Woodpackaging

The study estimated that of the approximately 49% of all containers entering New Zealand that contained some form of WP, 4.12% were estimated to be contaminated although it had been given biosecurity clearance (Table 7.12). The model estimated that although altering all the tested management procedures did have an effect on slippage, inspection efficiency had the strongest influence on slippage (Table 7.13). Increasing the inspection efficiency from 97% (the current rate) to 100% decreased slippage by 48% for all sea containers entering New Zealand per year (Table 7.17).

**Table 7.17** Total slippage along three pathways. Units of measure are units imported.

Imported units	97%	100%	% change
Used vehicles	2964	2	99.9
Sea containers	20758	1796	91
Woodpackaging	7246	3795	48

Intuitively the rate and accuracy of inspections and treatments of imported units at the border are key aspects of a biosecurity management system. It is also logical that if all units are treated upon arrival in New Zealand and treatment efficiency was 100%, then there would be zero slippage and no need for inspections. However given the number of units imported into New Zealand annually and the variety of importation

pathways and commodities, the infrastructure required and the time needed to conduct such treatments would adversely affect New Zealand's trade. In addition to the infrastructure and time needed, there are the environmental impacts of the treatments themselves that would also need to be considered. Therefore the policy decisions used in the sensitivity analyses were those that could be implemented with minimal or non-significant disruption to trade, were non biased and could be supported by science, as required by the international agreements that New Zealand is party to. As such, this study highlights how increasing the rate and accuracy of inspection of imports at New Zealand's borders reduces the risk of invasive species entering New Zealand via the three pathways, thus providing a balance between facilitating trade and maintaining New Zealand's Biosecurity.

Although it is widely accepted that inspection methods and treatment procedures for commodities and sea containers are not 100% accurate (Anon. 2003i, 2006d), the impact that 100% inspection and treatment efficiencies had on total slippage were estimated to highlight the effect that requiring more than the 97% accuracy currently expected of MAF inspectors had; a reduction in potential invasive species entering New Zealand undetected. Increasing current inspection efficiencies can be achieved through in-depth training of all persons inspecting the imported units and possibly longer time allowed for such inspections. As currently the majority of imported units are being inspected by persons other than MAF trained inspectors, increasing the efficiency of inspections can be considered to be achievable by altering the persons inspecting from those MAF accredited persons to MAF inspectors. This change in policy in conjunction with increasing inspection rates for all imported units is considered to have minimal impact on trade and the financial impact of such an alteration is the focus of the Chapter 8.

Methods and procedures for the inspection of sea containers and their contents are constantly being researched and updated, with substantial changes leading to a review of the import health standards themselves (Anon. 2000). Previous studies and reviews have suggested new techniques for internal inspections of containers, including x-ray screening of containers and a probe camera (Anon. 2003i), a more in-depth discussion of these potential aids for inspections is in Chapter 9.

## **7.5 Conclusion**

The simulation of all three pathways using the developed model demonstrated how altering the management procedures both for pre-shipment and at the border affects the rate at which contaminated used vehicles, containers and commodities passed biosecurity border procedures (slippage). The models showed that compulsory pre-shipment procedures for used vehicles and WP increased slippage, while compulsory border inspection and subsequent treatment along all three pathways moderately decreased slippage. Reducing slippage along all three importation pathways whilst facilitating trade, was most efficiently achieved by increasing the accuracy of inspections from 97% to 100% without altering any other border management procedures.

# Chapter 8

## Estimating the Cost of Future Slippage

*“Estimating the economic impacts that are associated with non-indigenous species is also difficult; nevertheless, enough data are available to quantify some of the impacts on agriculture, forestry, and public health.” (Pimentel et al. 2000).*

### 8.1 Introduction

Biosecurity activities are a critical aspect of New Zealand’s health, productivity and ability to gain access to foreign markets. While there is little doubt that the legislation aimed at protecting national biodiversity and productivity has significant benefits, there are associated costs. These costs are difficult to estimate, and little work has been published on the cost of complying with legislation and regulations (Anon. 2005), such as the BSA (1993) and related import and export regulations.

In terms of cost and benefit of biosecurity, the fundamental question is whether or not policy and regulations set in place are worthwhile, i.e. does the environment and society benefit more with the policies and regulations in place than they would in their absence (Smith and Clough 2000). Another key issue is the amount of resources a community or nation can put into maintaining or controlling biosecurity at all levels. Often, activities such as monitoring, managing or eradication of established pests are limited by resource constraints. Therefore economic assessments are carried out to determine optimal levels of resource allocation for the desired and realistic social and environmental benefits.

Smith and Clough (2000) conducted a review of the key economic issues facing New Zealand’s biosecurity systems, in which they concluded that *“Biosecurity can be regarded as a production process, like other aspects of security – protection against foreign adversaries, environmental catastrophes or the internal security breaches represented by criminal behaviour.”* In addition, as risks associated with biosecurity can be the result of unintentional introductions or unforeseen effects of deliberately introduced organisms,

economic principles for other accident prevention can loosely be applied to these biosecurity risks.

It is widely accepted that there are three general economic aspects to biosecurity:

1. Regulation of precautions that reduce either the chance of unintentional introductions and the unforeseen effects of deliberate introductions, or lessen their possible severity (pre-border management);
2. Effective border biosecurity measures (including inspections and treatments) and monitoring for incursions (border management); and
3. Response and management of incursions once they have been detected (post border management).

Although biosecurity measures can be seen as a combination of these complementary measures and activities, decisions are needed to determine the components required and the relative emphasis given to each chosen component. This decision process will ideally result in the most effective resource allocation in terms of benefit achieved at minimal cost (Smith and Clough 2000).

In order to understand the economics of biosecurity it is important to identify the inputs required, the outputs sought, and the transformation processes that will need to be applied. As each biosecurity risk or breach poses a unique set of risks, the measures used to achieve the desired results vary. The cost per unit of risk reduction achieved also varies, as do the costs and benefits within a community and across different communities (Smith and Clough 2000).

Smith and Clough (2000) highlight that in general, the cost of excluding unwanted organisms from New Zealand at the pre-border and border level is expected to be less than the cost of allowing them in and then dealing with the consequences. Smith and Clough also point out that the benefits of biosecurity activities (reducing risks or economic disruption from unwanted organisms) are indivisible, therefore logistically difficult to charge for on a user pays basis or taxing the wider community benefiting from it. However, there are biosecurity activities to which benefits can be clearly linked, e.g. industries or communities to specific interests, such as primary producers. Therefore, not all biosecurity measures need to be regarded as a national public good, thus providing

cases of biosecurity activities for which cost recovery from interested parties is possible (Smith and Clough 2000, Anon. 2006a) (see Chapter 6).

Currently in New Zealand, the majority of inspections for imported units (such as used vehicles and woodpackaging) and the vectors (sea containers) are conducted by MAF accredited persons at MAF approved transitional facilities (see Chapter 6). These facilities and their inspectors are required to be audited annually by MAF officials. The costs associated with these transitional facilities and MAF accredited persons and any inspections or audits by MAF officials are met by the importers. As such, the costs of managing New Zealand's biosecurity at the border are already being met by the import sector.

### **8.1.1 Objectives**

Given the nature of the benefits resulting from biosecurity activities are such that they are not always visible or measurable, quantifying them is very difficult. However, there must be a method of ascertaining the effectiveness of the policies in place. In order to measure a region's freedom from unwanted pests, critical thresholds can be set up, beyond which policies may be deemed as ineffective or failing. Such thresholds vary depending on the industry's or community's willingness to pay for a given level of biosecurity activity (Smith and Clough 2000).

In order to minimise the risks and costs associated with the importation of commodities and the craft that are used to transport them, regulations and standards have been developed. New Zealand along with other WTO and FAO member nations have developed individual standards and regulations that are in the best interest of the respective nation whilst still meeting the nations international commitments (Chapters 4 and 5). New Zealand's standards are known as Import Health Standards (IHS). In order to recover costs, the Ministry of Agriculture and Forestry (MAF) has set up regulations with which the Government recovers the costs of managing New Zealand's biosecurity (see Chapter 6) from industry sectors or individuals, who it deems risk exacerbators (Table 8.1).

**Table 8.1:** Users of Biosecurity; Beneficiaries and Exacerbators (Smith and Clough 2000)

Use beneficiaries	Non-use beneficiaries	Risk exacerbators
Commercial Farming	Public Health	Importers
Horticulture industry	Ecosystem biodiversity	Tourists
Forestry industry	Indigenous species	Primary industries
Fishing industry	Future generations	
Commercial animal breeders		
Future generations in these industries		

As importers are considered to be exacerbators, the Biosecurity Cost Regulations enables the Government to recover all costs associated with importation of commodities and vessels from the industry, including the cost of inspections conducted by MAF officials. As such the main objective was to predict the total recoverable cost of the inspections when all inspections are conducted by MAF inspectors for the three models developed in Chapter 7; Sea containers, Used vehicles and Woodpackaging (including Bark). The models developed are extensions of the four models in Chapter 7. With the specific aim to:

- Forecast the number of sea containers, used vehicles and woodpackaging (and bark) that are imported into New Zealand for the next 10 years; and
- Determine the recoverable cost of inspections when all inspections are conducted by MAF inspectors and with the increased efficiency required to achieve a specific slippage rate along each of the three pathways.

## 8.2 Methodology

The development of the three models for estimating the costs of the inspections along all three pathways are described in detail in Chapter 7 and Appendix IV. The findings of Chapter 7 indicate that the effectiveness or accuracy of inspections is a crucial aspect of the biosecurity system that can be altered by a policy decision that can reduce slippage into New Zealand with minimal impact on trade. For the purposes of this study, all inspections are conducted by MAF inspectors, who are assumed to have a certain level of knowledge and training and are considered to be experts. The recoverable cost of inspection along each pathway was calculated with the adapted three models (where the



bark was included in the woodpackaging model) and the total costs of inspections that are recoverable by the government were estimated. For details of each model see Chapter 7 and Appendix III and for the details of Biosecurity Cost Regulations see Chapter 6 and Appendix IV.

### **8.2.1 Cost per Inspection**

The recoverable cost of a MAF inspector is set out in the Biosecurity Cost Regulations 2003 and 2006 (see Chapter 6) as an hourly rate with associated costs such as travel miles being an additional charge. Based on the information available from various sources (see below for details), the time taken for inspecting units along the three pathways varied. For the purposes of these models the current inspection efficiencies were achieved with an average time of nine minutes to inspect a used car and average of one hour to inspect a sea container.

In order to increase the inspection efficiencies, the time taken for each inspection was calculated using an exponential decay curve (see the results section for details). The cost of each inspection along each of the three models developed in Chapter 7 was estimated by varying the time taken for each inspection by a MAF inspector, based on the hourly charge rate set out in the Biosecurity Cost Regulations 2003 and 2006.

### **8.2.2 Model Assumptions and Weaknesses**

The main purpose of these models was to establish a framework to analyse how the variables of the importation pathways affect the costs recovered by MAF. Several assumptions had to be made in order to construct these models:

- **Model development:** The models used in this section are extensions of the models described in Chapter 7, therefore the assumptions and weaknesses that are associated with those models also apply to the models used to estimate the cost of inspections;

- **Costing:** Due to the limited information available, the cost for increasing inspection accuracy was assumed to be time dependent for all three models, with factors like knowledge, training and experience not measured. Costs also incorporate the number of and time taken for inspections that are assumed to be conducted along all three pathways;
- **Used Vehicles:** Data was collected from several sources, thereby creating a discrepancy in the data. This model assumed that inspections last an average of 9 minutes (Anon. 2006e), with these times incorporated into the overall costs;
- **Sea containers:** Data was collected from several anonymous sources, with the average external inspection assumed to last 15 minutes and internal inspection lasting an hour. Again these inspection times were incorporated in the total costs along this pathway;
- **Woodpackaging:** Data from several sources indicated that the inspections lasted about an hour, as they are an internal inspection of a container. Therefore each inspection is assumed to be an hour long. This is incorporated into the total inspection costs along this pathway.

### 8.3 Results

Total slippage and associated recoverable inspection costs along the three pathways (Sea containers, used vehicles, woodpackaging) were estimated with the three models described in Section 7.3. The results are presented here for each of the three pathways.

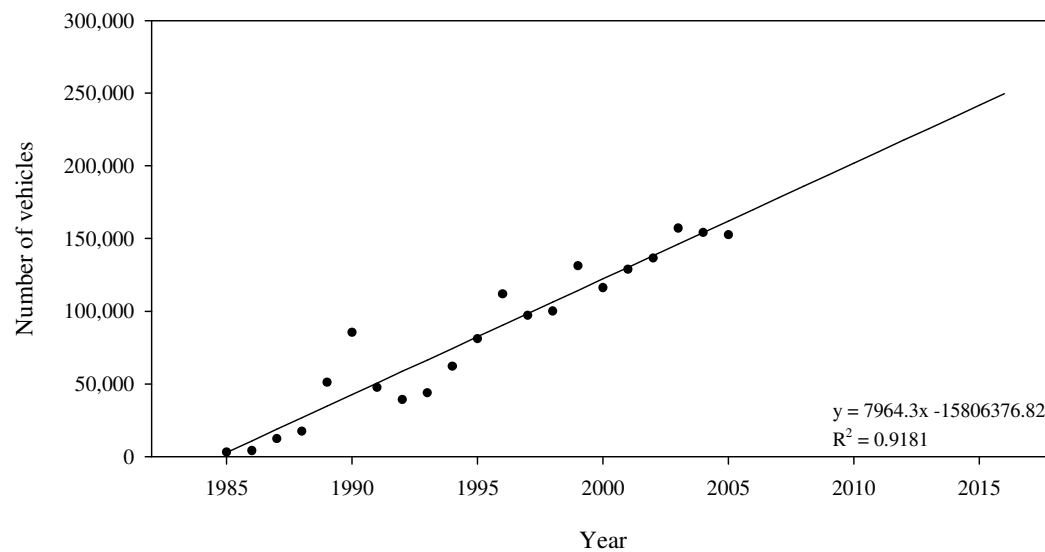
#### 8.3.1 Used vehicles

The following regression was fitted to the data presented by NZTA<sup>74</sup>, to linearly extrapolate the number of used vehicles imported into NZ until 2016 (Figure 8.1).

$$\text{Number of cars} = 7964.3 * \text{year} - 15.81 \times 10^6 \quad (8.1)$$

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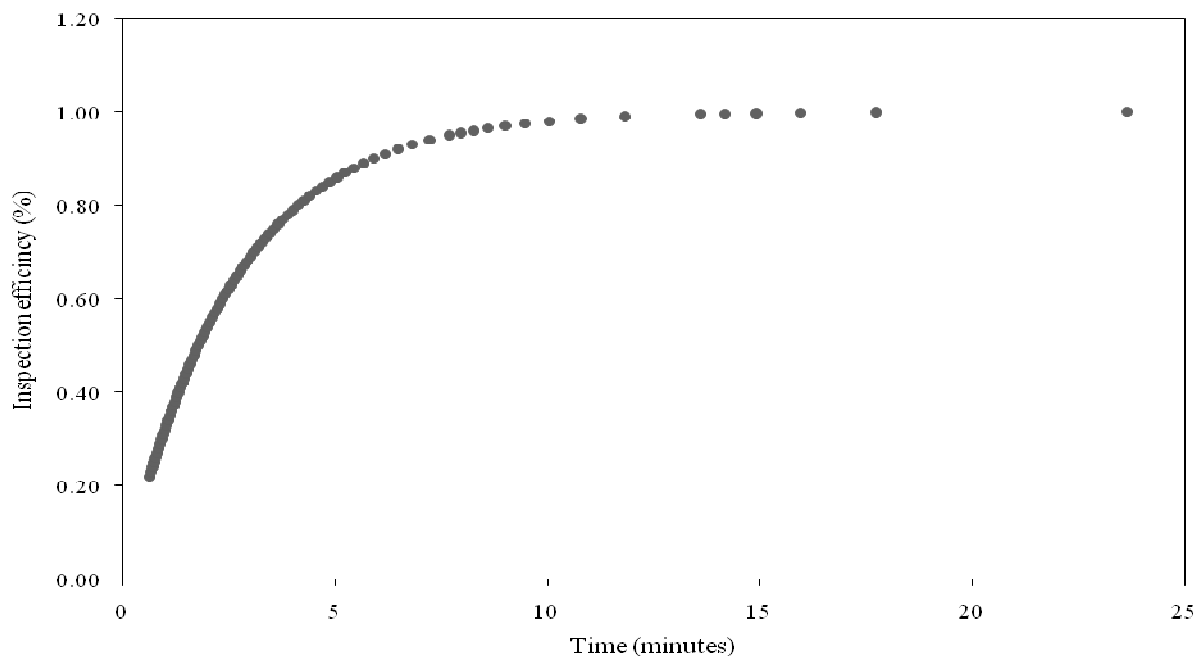
<sup>74</sup> <http://www.landtransport.govt.nz/statistics/motor-vehicle-registration/2005/> 07 July 2006



**Figure 8.1** The number of used vehicles imported into New Zealand from 1985 to 2016

The following equation was used to extrapolate the time taken per inspection to achieve a given inspection efficiency (Figure 8.2).

$$\text{Inspection Efficiency} = 1 - \exp(-0.38962 \cdot \text{Time}) \quad (8.2)$$



**Figure 8.2** The time taken to achieve a given inspection efficiency for used vehicles.

Using the predicted number of used vehicles imported from equation 8.1 the total slippage per year along the used vehicle pathway for the next 10 years was estimated. There was a

predicted 35.09% (104,456 vehicles) increase in the annual number of used vehicles imported into New Zealand (Table 8.2). To increase the inspection efficiency from the current 97% to 100%, the time taken per inspection increased by a factor of 2.67 from 9 minutes to 24 minutes per inspection using equation 8.2 (Figure 8.2). The recoverable cost of inspecting used vehicles was predicted to total \$5.44 million for 2006 under current inspection efficiencies and Cost Regulations, with a total of 3,310 contaminated used vehicles entering New Zealand undetected in 2006. Increasing the inspection efficiency from 97% (the current rate) to 100% increased the overall recoverable cost by 61.92% annually and slippage decreased to 2 used vehicles per year. A comparison between the Cost Regulations of 2003 and 2006 showed that the 2006 regulations also increased the recoverable cost of inspecting vehicles by 27.7% annually.

**Table 8.2** Predicted total slippage and cost of total inspections from 1993 to 2016 for import used vehicles for the Biosecurity (cost) Regulations 2003 and 2006: at 97% and 100% inspection efficiency. (Cost units NZ\$ millions).

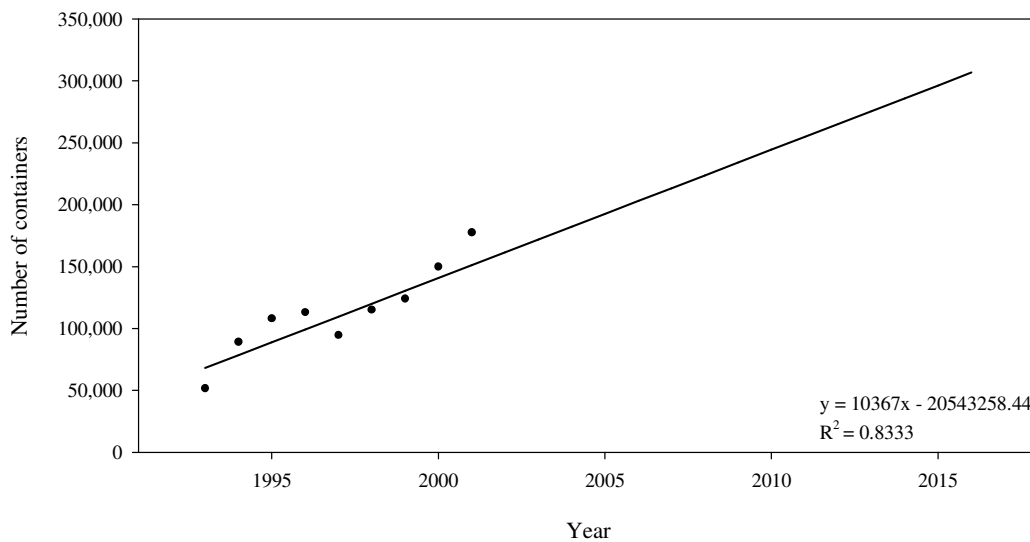
mmions).

Year	Predicted number of used vehicles	Predicted total Slippage	97%		100%		
			\$		\$		
			2003	2006	Predicted total Slippage	2003	2006
1993	79257	1294	1.54	2.13	0.8	4.04	5.59
1994	88753	1449	1.72	2.38	0.9	4.52	6.25
1995	98249	1604	1.91	2.64	1.0	5.01	6.92
1996	107745	1759	2.09	2.89	1.1	5.49	7.59
1997	117241	1914	2.27	3.15	1.2	5.97	8.26
1998	126737	2069	2.46	3.40	1.3	6.46	8.93
1999	136233	2225	2.64	3.66	1.4	6.94	9.60
2000	145730	2380	2.83	3.91	1.5	7.43	10.27
2001	155226	2535	3.01	4.16	1.6	7.91	10.94
2002	164722	2690	3.20	4.42	1.7	8.39	11.61
2003	174218	2845	3.38	4.67	1.8	8.88	12.28
2004	183714	3000	3.56	4.93	1.9	9.36	12.95
2005	193210	3155	3.75	5.18	2.0	9.84	13.62
2006	202706	3310	3.93	5.44	2.1	10.33	14.28
2007	212202	3465	4.12	5.69	2.2	10.81	14.95
2008	221698	3620	4.30	5.95	2.3	11.30	15.62
2009	231194	3775	4.48	6.20	2.5	11.78	16.29
2010	240690	3930	4.67	6.46	2.6	12.26	16.96
2011	250186	4085	4.85	6.71	2.7	12.75	17.63
2012	259682	4240	5.04	6.97	2.8	13.23	18.30
2013	269178	4395	5.22	7.22	2.9	13.71	18.97
2014	278674	4550	5.41	7.48	3.0	14.20	19.64
2015	288170	4705	5.59	7.73	3.1	14.68	20.31
2016	297666	4860	5.77	7.99	3.2	15.17	20.98

### 8.3.2 Sea Containers

The following regression was fitted to unpublished data from MAF (2004), to extrapolate the number of sea containers entering NZ from all countries every year until 2016 (Figure 8.3).

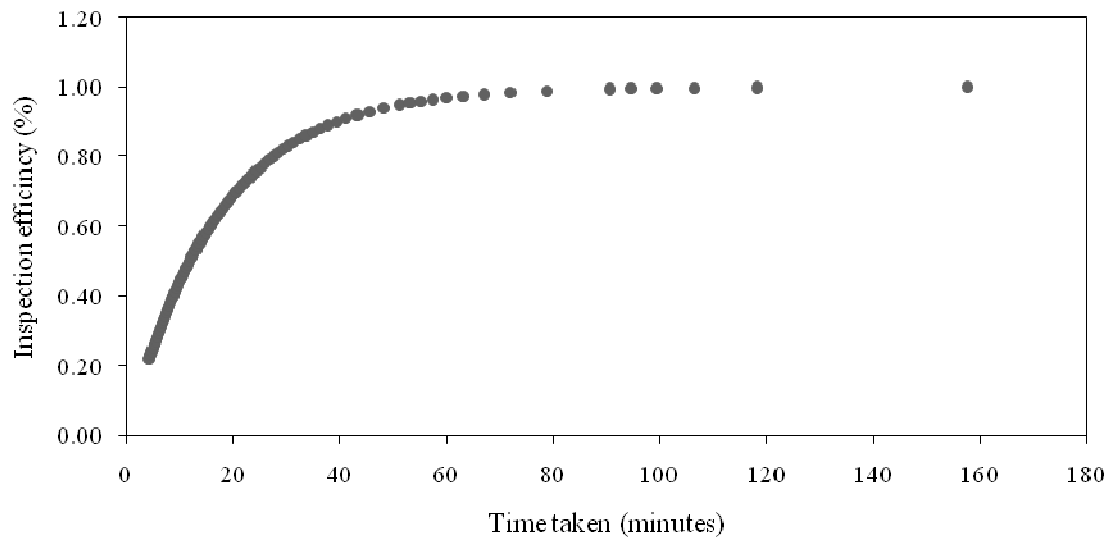
$$\text{Number of containers} = 10367 * \text{year} - 20.54 \times 10^6 \quad (8.3)$$



**Figure 8.3** The number of sea containers imported into New Zealand from 1993 to 2016

The following equation was used to extrapolate the time taken per inspection to achieve a given inspection efficiency (Figure 8.4).

$$\text{Inspection Efficiency} = 1 - \exp(-0.058443 * \text{Time}) \quad (8.4)$$



**Figure 8.4** The time taken to achieve a given inspection efficiency for sea containers.

Using the predicted number of sea containers imported from equation 8.3, the total slippage per year along the sea container pathway for the next 10 years was estimated. There was a predicted 28.99% (213,060 sea containers) increase in the annual number of sea containers imported into New Zealand (Table 8.3). To increase the inspection efficiency from the current 97% to 100%, the time taken per inspection increased by a factor of 2.63 from 60 minutes to 158 minutes per inspection using equation 8.4. The recoverable cost of inspecting sea containers (external and internal) was predicted to total \$117.36 million for 2006 under current inspection efficiencies and Cost Regulations, with a total of 30,011 contaminated sea containers entering New Zealand undetected. Increasing the inspection efficiency from 97% (the current rate) to 100% increased the overall recoverable cost by 42.98% and slippage decreased to 2,596 sea containers, for 2006. A comparison between the Cost Regulations of 2003 and 2006 showed that the 2006 regulations also increased the recoverable cost of inspecting sea containers by 27.7% annually.

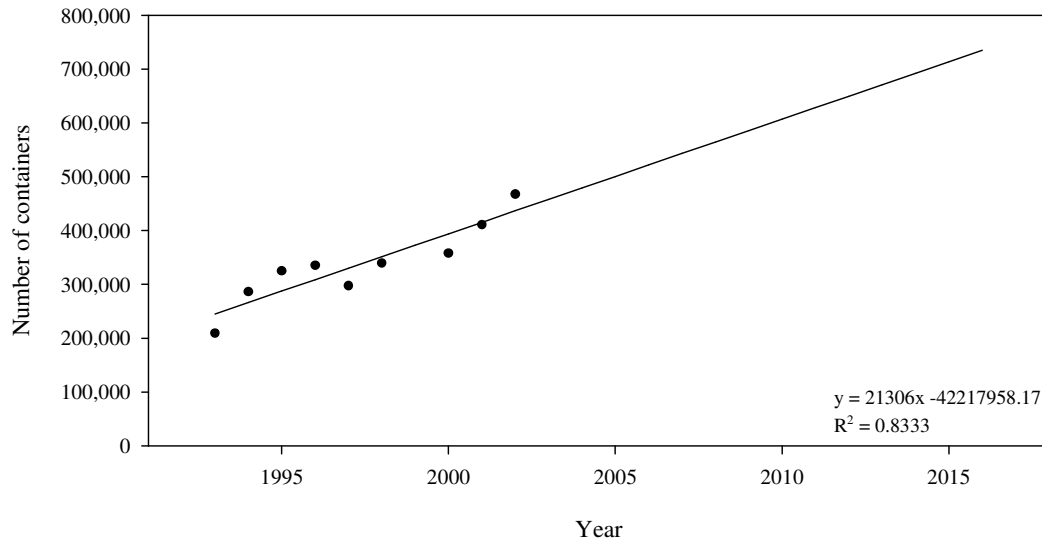
**Table 8.3** Predicted total slippage and cost of total inspections from 1993 to 2016 for sea containers imported from all countries for both 2003 and 2006 Biosecurity (cost) recovery regulations: at 97% and 100% inspection efficiency. (Cost units NZ\$ million).

Year	Predicted number of containers	Predicted total slippage	97%		Predicted total slippage	100%	
			\$	\$		\$	\$
			2003	2006		2003	2006
1993	244900	14083	39.82	55.07	1218	69.83	96.58
1994	266206	15308	43.28	59.86	1324	75.90	104.98
1995	287512	16533	46.75	64.65	1430	81.98	113.38
1996	308818	17759	50.21	69.45	1536	88.05	121.79
1997	330124	18984	53.67	74.24	1642	94.13	130.19
1998	351430	20209	57.14	79.03	1748	100.20	138.59
2000	394042	22659	64.07	88.61	1960	112.35	155.39
2001	415348	23885	67.53	93.40	2066	118.43	163.80
2002	436654	25110	70.99	98.19	2172	124.50	172.20
2003	457960	26335	74.46	102.98	2278	130.57	180.60
2004	479266	27560	77.92	107.77	2384	136.65	189.00
2005	500572	28785	81.39	112.57	2490	142.72	197.41
2006	521878	30011	84.85	117.36	2596	148.80	205.81
2007	543184	31236	88.31	122.15	2702	154.87	214.21
2008	564490	32461	91.78	126.94	2808	160.95	222.61
2009	585796	33686	95.24	131.73	2914	167.02	231.01
2010	607102	34911	98.71	136.52	3020	173.10	239.42
2011	628408	36137	102.17	141.31	3126	179.17	247.82
2012	649714	37362	105.63	146.10	3232	185.25	256.22
2013	671020	38587	109.10	150.90	3338	191.32	264.62
2014	692326	39812	112.56	155.69	3444	197.40	273.03
2015	713632	41037	116.03	160.48	3550	203.47	281.43
2016	734938	42263	119.49	165.27	3656	209.55	289.83

### 8.3.3 Wood Packaging

The following regression was fitted to unpublished data from MAF (2004), to interpolate the number of container with WP entering NZ every year until 2016 (Figure 8.5).

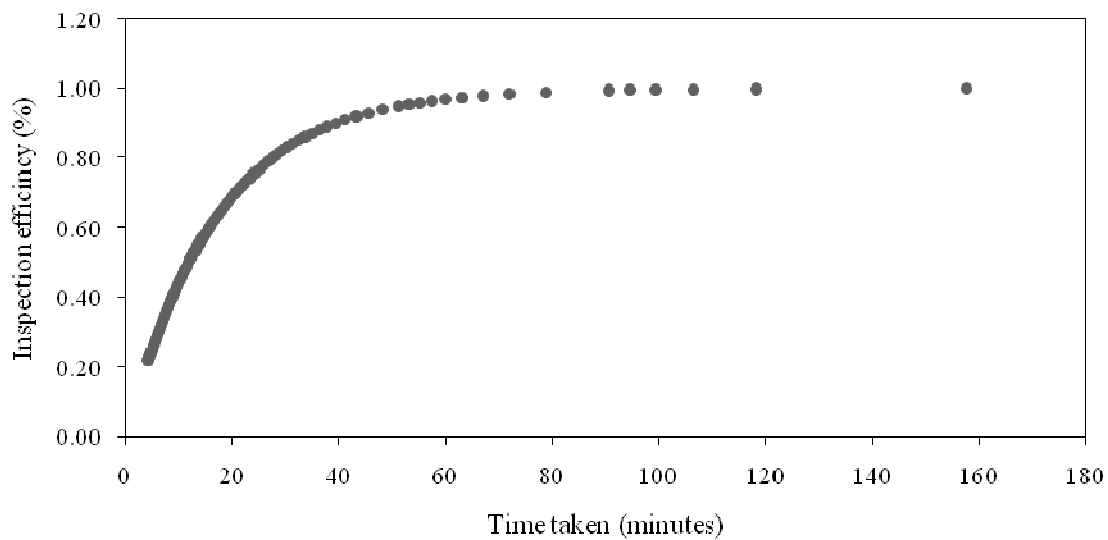
$$\text{The number of containers} = 21306 * \text{year} - 42.22 \times 10^6 \quad (8.5)$$



**Figure 8.5** The predicted number of sea containers with WP imported into New Zealand from 1993 to 2016

The following equation extrapolate the time taken per inspection to achieve a given inspection efficiency (Figure 8.6).

$$\text{Inspection Efficiency} = 1 - \exp(-0.058443 \cdot \text{Time}) \quad (8.6)$$



**Figure 8.6** The time taken to achieve a given inspection efficiency for wood packaging within sea containers

Using the predicted number of sea containers containing woodpackaging imported from equation 8.5 the total slippage per year along the sea container pathway for the next 10 years was estimated. There was a predicted 31.98% (114,037 sea containers) increase in



the annual number of sea containers containing woodpackaging imported into New Zealand (Table 8.4). To increase the inspection efficiency from the current 97% to 100%, the time taken increased 2.63 times from 60 minutes to 158 minutes per inspection using equation 8.6. The recoverable cost of inspecting sea containers containing woodpackaging material (external and internal) was predicted to total \$25.42 million for 2006 under current inspection efficiencies and Cost Regulations, with a total of 15,561 sea containers containing contaminated woodpackaging material entering New Zealand undetected. Increasing the inspection efficiency from 97% (the current rate) to 100% increased the overall recoverable cost by 61.96% and slippage decreased to 13,138 sea containers in 2006. A comparison between the Cost Regulations of 2003 and 2006 showed that the 2006 regulations also increased the recoverable cost of inspecting vehicles by 27.7% annually.

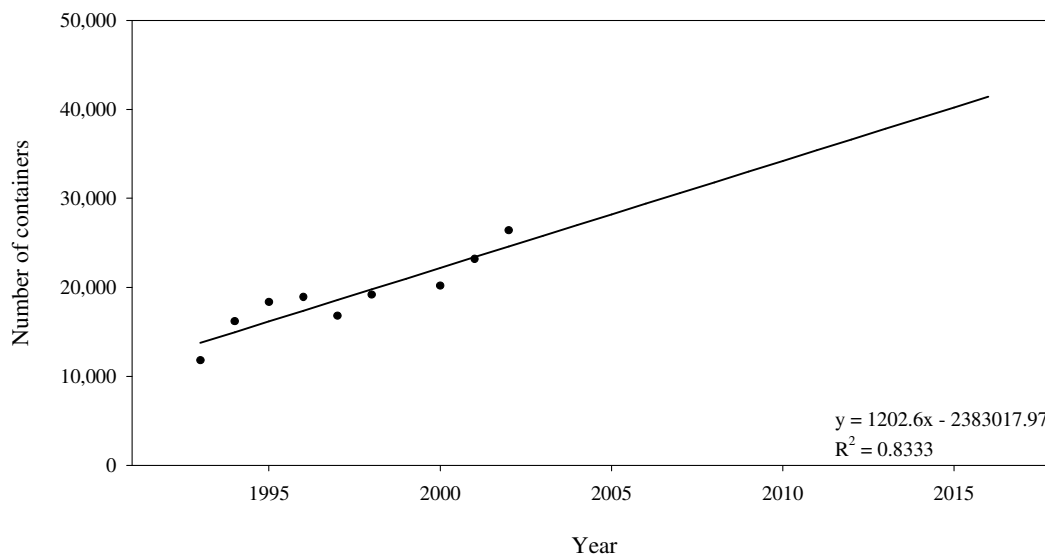
**Table 8.4** Predicted total slippage and cost of total inspections from 1993 to 2016 for sea containers with woodpackaging imported from all countries for both the 2003 and 2006 Biosecurity (cost) recovery regulations: at 97% and 100% inspection efficiency. (Cost units NZ\$ million)

Year	Predicted number of containers	Predicted total Slippage	97		Predicted total Slippage	100	
			\$			\$	
			2003	2006		2003	2006
1993	118173	7270	11.87	16.42	6138	31.19	43.14
1994	128540	7908	12.92	17.87	6676	33.93	46.92
1995	138907	8546	13.96	19.31	7215	36.66	50.71
1996	149274	9183	15.00	20.75	7753	39.40	54.49
1997	159641	9821	16.04	22.19	8292	42.13	58.28
1998	170008	10459	17.08	23.63	8830	44.87	62.06
1999	180375	11097	18.13	25.07	9368	47.61	65.85
2000	190742	11735	19.17	26.51	9907	50.34	69.63
2001	201109	12372	20.21	27.95	10445	53.08	73.42
2002	211476	13010	21.25	29.39	10984	55.82	77.20
2003	221843	13648	22.29	30.83	11522	58.55	80.99
2004	232210	14286	23.33	32.27	12061	61.29	84.77
2005	242577	14923	24.38	33.71	12599	64.02	88.55
2006	252944	15561	25.42	35.16	13138	66.76	92.34
2007	263311	16199	26.46	36.60	13676	69.50	96.12
2008	273678	16837	27.50	38.04	14214	72.23	99.91
2009	284045	17475	28.54	39.48	14753	74.97	103.69
2010	294412	18112	29.58	40.92	15291	77.71	107.48
2011	304779	18750	30.63	42.36	15830	80.44	111.26
2012	315146	19388	31.67	43.80	16368	83.18	115.05
2013	325513	20026	32.71	45.24	16907	85.91	118.83
2014	335880	20663	33.75	46.68	17445	88.65	122.62
2015	346247	21301	34.79	48.12	17984	91.39	126.40
2016	356614	21939	35.83	49.56	18522	94.12	130.18

### 8.3.4 Bark

The following regression was fitted to unpublished data from MAF (2004) to interpolate the number of sea containers with WP contaminated with bark entering New Zealand until 2016 (Figure 8.7).

$$\text{Number of containers} = 1202.6 * \text{year} - 23.83 \times 10^5 \quad (8.7)$$



**Figure 8.7** The number of sea containers with WP contaminated with bark imported into New Zealand from 1993 to 2006

Using equation 8.7 the total slippage for sea containers containing WP material contaminated with bark imported into New Zealand until 2016 was predicted. The model predicted that the number of sea containers containing WP material contaminated with bark imported increased by 46.92% (13229 containers) from 2005 to 2016. As the bark model only considers bark that is a contaminant of WP, all the costs associated with the inspection of containers with WP also apply to bark (see Part 8.3.3 of this chapter).

## 8.4 Discussion

The cost of managing New Zealand's biosecurity is ever increasing as a result of increasing volumes of international trade and the increasing number of nations that New Zealand trades with (Chapter 3). The increasing volume of trade has placed a huge demand on the infrastructure in place to manage biosecurity risks, including inspections themselves, the inspection facilities and the points of entry (Anon. 2006e, d). In order to

meet the financial demands of managing biosecurity, the New Zealand Government introduced the Recovery (Cost) Regulations in 2003, which were revised in 2006 (Chapter 6). These regulations provide the Government with the means to recover cost for biosecurity measures that are a direct result of imports (i.e. cost of inspection conducted by MAF officials), from the importers who are considered to be exacerbators. In a 2005 report, the cost of compliance with biosecurity clearance measures for the import industry (Table 8.5) was estimated to be between \$81 million to \$125 million per annum which is approximately 0.9-1.4% of the total value of the “risk goods” imported into New Zealand annually (Anon. 2005).

**Table 8.5** The distribution of the costs associated with managing New Zealand’s biosecurity between the Importers (exacerbators) and MAF Biosecurity New Zealand.

Importers	Biosecurity New Zealand
Establishing Transitional facility	Training of staff
Training staff to run transitional facility	Managing and or eradicating any invasive species
Employing any additional staff	
Managing and maintaining the transitional facility	
Auditing of the transitional facility by a MAF official	
Inspections required by a MAF inspector	
Analysis of any contaminant found	
Managing any contaminant found within the transitional facility	

The models developed in Chapter 7 showed that the accuracy or efficiency of the inspections at New Zealand’s borders was the most influential step in the three pathways in terms of decreasing over slippage entering New Zealand. Increasing the efficiency of inspections (either by increasing the time taken per inspection or by increasing the knowledge and experience base of those inspecting) at New Zealand’s border is considered to have minimal impact on the commitments to the various international trade agreements the New Zealand Government is party to (see Chapter 4).

It is intuitive that an increased efficiency is achievable by increasing the time taken per inspection and by ensuring that the inspections are conducted by adequately trained and experienced individuals. For the purposes of this study MAF inspectors were considered

to be adequately trained and experienced inspectors that can effectively inspect units in the time needed. Based on MAF inspectors conducting all required inspections per unit imported, the time taken per inspection was varied to increase the inspection efficiency from the currently accepted 97% to the ideal 100% and this study highlights the cost of such an increase for the import sector.

#### **8.4.1 Cost of Compliance under Current Conditions**

Currently only the used vehicles without pre-shipment inspections require compulsory border inspection, whilst a random 10% of used vehicles with pre-shipment inspections are inspected upon arrival. With these inspection rates and under the 2006 Cost Regulations, this study estimated that the total cost of recoverable inspections would increase by 46.8.% or by \$2.55 million from 2006 to 2016, based on the estimated increase in the number of used vehicles imported into New Zealand annually.

Since 2003, all containers and their contents were to undergo full inspection irrespective of any pre-shipment inspections or treatments. With this 100% inspection rate and under the 2006 regulations, the total recoverable cost of inspecting sea containers was estimated to increase by 40.8% or approximately \$47.91 million from 2006 to 2016, based on the estimated increase in the number of sea containers imported into New Zealand annually.

The woodpackaging used in sea containers requires separate inspections based on the IHS Woodpackaging Material from All Countries (2003). This requires that all woodpackaging without ISPM 15 stamp to be inspected while only 10% of woodpackaging with the ISPM 15 stamp is inspected upon arrival. With these inspection rates and under current (2006) Cost Regulations, this study estimated that the total cost of recoverable inspections would increase by 40.9% or by \$14.4 million from 2006 to 2016, based on the estimated increase in the number of sea containers packed with woodpackaging material imported into New Zealand annually.

### 8.4.2 The Cost of Increasing Inspection Efficiency

Increasing the inspection efficiency along the three pathways from the current level (97%) to the ideal 100% was estimated to increase the cost of inspections by 61.92% (\$8.84 million), 75.36% (\$164.48 million) and 61.96% (\$57.18 million) respectively for used vehicles, sea containers and woodpackaging (Table 8.6). These correspond to an increase of \$43.61 per used vehicle inspected from the estimated current recoverable cost per inspection of \$26.83 to a total of \$70.44 per vehicle, an increase of \$169.48 per container inspected from the estimated current recoverable cost per inspection of \$224.88 to a total of \$394.36 per container and an increase of \$226.05 per container packed with woodpackaging inspected from the estimated current recoverable cost per inspection of \$139.00 to a total of \$365.06 per container packed with woodpackaging material.

As the cost of inspecting WP encapsulates any contaminant of WP, including bark, the models were not used to estimate the cost of inspecting WP with bark separately. The reason for simulating the number of containers containing WP contaminated with bark was to highlight the risk potential of bark alone as a contaminant.

**Table 8.6** The predicted increase in cost of inspections per unit imported into New Zealand. (Cost units NZ\$ million)

Imported unit	2003		2006		% Change
	97% (\$)	100% (\$)	97% (\$)	100% (\$)	
Used Vehicles	19.40	50.95	26.83	70.47	61.92
Sea containers	162.58	285.12	224.88	394.36	75.36
Woodpackaging	100.49	263.94	138.98	365.06	61.96

It is important to note that there are other costs involved in attaining compliance with biosecurity regulations that are also recoverable by MAF but were not covered by these models; such as, travelling related costs of MAF inspectors, inspection of documents, identification of organisms found and monitoring and verification of sea containers (Anon. 2006e). The models developed also did not allow for the possibility that the importation rates of commodities (especially used vehicles) and sea containers reaches a plateau before 2016.

In addition to the costs the importer is expected to pay MAF, the importer has to pay for other processes such as treatment, destruction and transport, as well as the ‘down time’ (the time needed for all procedures to be completed, during which the importer is unable to either sell or use the commodity) before the imported item is given biosecurity clearance. Anon. (2005) estimated the total costs of compliance to be an average of c. \$224-\$400 per untreated used vehicle imported and c. \$200 per imported used vehicle that under went pre-shipment procedures.

As the cost of protecting New Zealand’s environmental, economic and public health can be divided into two major areas; prevention and management, it is important to gauge the cost of the trade off between facilitating trade and the New Zealand’s Government sovereign right to protect New Zealand. Although Pimentel *et al.* (2000) and (2004) discussed the difficulty in measuring the true cost of invasive species in the United States of America, they go some way to establishing an estimate cost of known invasive species. Pimentel *et al.* (2000) and (2004) estimated that invasive alien species cause \$US 137 billion per year in environmental damage and losses in 2000 and \$US 120 billion per year in 2004. In New Zealand, 93% (c. \$NZ 20.6 million) of the cost of border biosecurity in 2006 was funded by third parties (i.e. import sector), which indicates that the bulk of MAF’s resources, in conjunction with the resources of the Department of Conservation, was utilised for management of invasive species post border.

## **8.5 Conclusion**

Based on the most efficient scenario for each of the four importation pathway described in Chapter 7; the total cost of inspections recoverable by MAF were estimated for all used vehicles, sea containers, woodpackaging and bark imported into New Zealand. The models estimated that there was an approximate increase of 50% in volume imported from 2005 to 2016 along all four pathways; and increasing the inspection efficiency to 100% required an increase of between \$0.34 million and \$4.54 million annually.

# Chapter 9:

## Discussion

*“The current regulation of biological invasions rests on an unwarranted presumption (that the invader will cause no harm) and on risk assessment procedures that are narrowly focused, subjective, often arbitrary and unquantified, and subject to political interference. Although this current approach dominates international treaties and most national policies, it has not stemmed the rising tide of biological invasions.”* (Simberloff 2005)

### 9.1 Introduction

To conserve the unique biota of New Zealand, the New Zealand Government must adequately protect its borders from biological invasions (Chapters 2 and 6). To provide the desired level of protection within the continually changing global environment requires ongoing research, revision of border management procedures and relevant legislation (Simberloff 2005, Simberloff *et al.* 2005). The increasing number of nations New Zealand trades with increases the potential risks associated with trade (Work *et al.* 2005, Haack 2006). The protection of New Zealand’s borders against the introduction of unwanted pests and organisms is referred to as Biosecurity (Chapter 2). In 2001 the New Zealand Biosecurity Strategy Development Team clearly defined biosecurity for the first time as *“the protection of New Zealand’s economy, environment and people’s health from the risks posed by pests and diseases”*<sup>75</sup>.

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<sup>75</sup> (Anon. 2001c)

## **9.2 The Role of International Agreements in the Development of Domestic Biosecurity Legislation and Regulations in New Zealand**

As a member of international organisations New Zealand's domestic legalisation and regulations relating to trade have to be in accordance with the trade agreements New Zealand is party too. While some of these international agreements and treaties have some environmental protection provisions, it is important to remember that their primary emphasis is on reducing barriers to trade, which can encourage the least restrictive measures for preventing the introduction of alien species (Everett 2000). Although the scopes of the international agreements are far reaching and can include some environmental provisions, they do not specifically refer to biosecurity (Chapter 4). Despite the lack of direct references to biosecurity, these international agreements include aspects that influence how New Zealand and other member nations restrict the movement of commodities and vessels (Powell 2002). International trade agreements (such as the General Agreement on Trade and Tariffs (GATT) (1947 and 1994) and the Sanitary and Phytosanitary (SPS) Agreement (1995)) require any restriction placed on the trade of any commodity from another member nation to be based on scientific evidence (Anon. 2003a). The emphasis placed on risk assessment as a means of balancing trade and biosecurity measures is problematic given that it is impossible to truly assess all the possible risks involved in trade, and it is also difficult to quantify the known risks (Simberloff 2005). Thereby it is made difficult for a nation to defend any decision to restrict or prevent the entry of a commodity that may possibly be a vector for unwanted pests and diseases in the current international environment (for example the changes the New Zealand Government made for the importation of Californian Table Grapes in 2001) (Anon. 2002b). The dependence on risk assessment also has the potential to limit further development of current policies and management procedures as the current resource allocations restrict the research into potential risks (Simberloff 2005, Simberloff *et al.* 2005). This is supported by the findings of this study, which suggests that the current biosecurity management in New Zealand requires more resources to be allocated to maintain the management procedures themselves as well as to the building of a more in-depth information base (Chapter 8).

When developing the Biosecurity Act (BSA) (1993) the New Zealand Government had to reach a balance between facilitating trade and protecting its national interests in



accordance with its international obligations as a member of the WTO and FAO (Chapter 5) (Anon. 2003a). The sections of the Act relating to the importation of goods, vessels and people in Part III of the Act have the most relevance in terms of international trade and how New Zealand meets its international obligations. Although Part III does not substantively alter the previous importation procedures as such (Webb 1995) it requires that all importations must be given a biosecurity clearance before being allowed into New Zealand, irrespective of the commodity, vessel or person having already obtained an import permit in accordance with the relevant import health standard (IHS). This is especially the case when importing commodities deemed 'risk goods' by the Ministry of Agriculture and Forestry (MAF) (Chapter 5), the majority of which are imported from the Pacific Islands, Africa and Central/South America (Chapter 3) (Anon. 2003i). In terms of international trade, the most relevant aspect of Part III is Section 22, which allows for the development of standards that all imports are required to meet before being imported.

Developing IHS under Section 22 of the Biosecurity Act (1993) (Chapter 5), MAF must abide Article 3, Paragraph 3 of the SPS (1995) Agreement, which allows for the development of domestic risk assessment and appropriate measures under specific conditions (Chapter 4). This paragraph provides the means for trading nations to develop procedures and standards, which provide the level of protection deemed appropriate by that nation. Procedures and standards developed by a member nation are required to be non-discriminative and non-arbitrary and must only be applied if necessary and only to the extent required. However, one problematic aspect of the SPS (1995) its underlying assumption that introduced species can be considered as safe. The risk associated with the introduction of new species should have to be proven instead of assumed prior to the importation of the species into new environments (Simberloff 2005).

An integral aspect of the international agreements is the harmonization of standards relating to the importation requirements such as treatments. An example of this is the ISPM 15 for woodpackaging material. This international standard requires woodpackaging material to be treated in a specific manner, which in turns reduces the importation requirements of consignments packed with material carrying the ISPM 15 stamp. However, recent studies have shown that the international standards which

encourage less restrictive inspection procedures may not be as effective as believed, for example ISPM 15 of woodpackaging material, Haack (2006), Haack and Petrice (2009), and Zahid (2008) demonstrated that woodpackaging material that is ISPM 15-compliant can be re-infected with wood boring insects and fungi after treatment, especially when bark is present, or the treatment itself may not be effective. This is supported by this study, which shows that although all the prescribed international precautions were taken approximately 5.75% of all sea containers entering New Zealand annually have some form of contamination (Chapter 7). These findings are also supported by other studies, which have shown that international trade is the major pathway for the introduction of invasive species despite international standards relating to biosecurity (Stanaway *et al.* 2001, Simberloff 2005, Simberloff *et al.* 2005, Work *et al.* 2005, Costello *et al.* 2007, Colunga-Garcia *et al.* 2009, Vizzini 2009).

Despite allowing for the development of domestic standards, the WTO and FAO encourage member nations to adopt the international standards developed by the Codex Commission (for plant and plant products) and the OIE (animal and animal products) (Chapter 4). Nevertheless, where scientific evidence provides sufficient proof, the WTO and FAO allow procedures and standards to be more stringent in order for nations to adequately protect their environmental, economic and public health. However, when import restrictions are placed on specific commodities, and sometimes specific commodities from specific nations, member nations of the WTO and FAO are required to substantiate these restrictions within the WTO or FAO dispute forums. This highlights that the focus of the WTO and FAO is to ensure the economic stability of the international market and that market restrictions must be completely justified, with the SPS (1955) preserving risk assessment (Chapter 6) as the basis for limiting trade (Simberloff 2005).

### **9.3 How Effectively New Zealand Manages its Borders**

New Zealand trades with approximately 135 different countries, with sea containers originating from over 924 seaports worldwide (unpublished MAF data). In addition to the large number of possible points of origin, the vast variety and sheer volume of commodities imported (Chapter 3) have lead to an increase in the possible risks associated with international trade (Anon. 2001d, Stanaway *et al.* 2001, Anon. 2003a,

Simberloff 2005). The volume and variety of trade exceeded the infrastructures at New Zealand's six major seaports receiving international sea containers (Stephenson *et al.* 2003), therefore under Section 39 of the BSA (1993) MAF developed transitional facilities (Chapter 6). A transitional facility can be any area anywhere within New Zealand that meets the requirements set out by MAF for inspection, storage, treatment and quarantine as well as for the holding and destruction of uncleared goods imported into New Zealand (Anon. 2003h). Given the function of these transitional facilities, they can be considered as points of entry along with sea and airports (Chapter 6). IHS have been introduced for the development of transitional facilities and for the procedures involved with transitional facilities receiving a variety of goods (Anon. 2006d). In addition there are also standards that outline the maintenance and regular auditing of each facility. Each facility is approved for a given period of time after which approval must be reapplied for. This leads to the annually varying number of transitional facilities. Over 7000 such registered facilities existed in April 2004.

In January 2003 MAF implemented a 100% sea container inspection policy (Anon. 2003b, i) i.e. every container imported into New Zealand is required to undergo a full six sided external inspection and a full internal inspection. These inspections are to be conducted at approved transitional facilities by MAF accredited persons. Any contamination found is to be reported to MAF through an online reporting system<sup>76</sup> and the contamination must be dealt with in the manner prescribed in relevant IHS. Initially, MAF accredited persons were trained online, with the applicant reading online modules and completing an online questionnaire. The flaws of this accreditation process were highlighted by the Royal Forest and Bird Protection Society, when one member of the society gained accreditation for sea container inspection for his pet cat on 17 February 2004<sup>77</sup>. Although the accreditation process has since become more involved<sup>78</sup>, for a person to become accredited to conduct the inspections, still no formal training or background in science is required. Apart from

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<sup>76</sup> [http://atf.maf.govt.nz/\\_ins/welcome.aspx?ReturnUrl=%2fDefault.aspx](http://atf.maf.govt.nz/_ins/welcome.aspx?ReturnUrl=%2fDefault.aspx) 28-02-2007

<sup>77</sup> [http://www.forestandbird.org.nz/mediarelease/2004/0217\\_cat accreditation.asp](http://www.forestandbird.org.nz/mediarelease/2004/0217_cat accreditation.asp) 28-02-2007

<sup>78</sup> <http://www.biosecurity.govt.nz/commercial-transport-and-border-management/registration/operators-and-inspectors> 28-02-2007

the auditing of transitional facilities undertaken by MAF inspectors, the reporting system relies on the integrity of these MAF accredited persons, of which there were 21,630 on 17<sup>th</sup> January 2007<sup>79</sup>.

In the first nine months of 2006, 327,864 sea containers were imported into New Zealand from 55 different countries, 1.8% (5,755 containers) of which were found to be contaminated when inspected by MAF accredited persons (Anon. 2006b, c). It is interesting to note that MAF acknowledges that a reported 25,370 containers entered New Zealand in that same period from unknown origins (Anon. 2006b, c). The models used in this study, however, predicted that in addition to the contamination found at inspection some contamination passes through inspections unnoticed and enters New Zealand (Chapter 7). The model estimated that under current regulations and procedures approximately 1.63% of used vehicles and 5.75% of sea containers enter New Zealand with biosecurity clearance although they are in fact contaminated (slippage). The models showed further that, although altering some border management procedures had an effect on the total slippage, the accuracy of the inspections was the most influential aspect of the current management process with regard to slippage. Increasing the inspection accuracy from the 97% MAF currently expects of its inspectors (Anon. 2003c) to the ideal 100% reduced the total slippage rate by 99.9% for used vehicles and 91% for sea containers imported annually.

Although the predicted current slippage rates appear to be low, these rates of 1.63% (used vehicles) and 5.75% (sea containers) represent approximately 2,969 contaminated used vehicles and 20,759 contaminated sea containers that entered New Zealand in 2006. It is important to remember that given there are now over 7,000 points of entry (including transitional facilities, sea and airports: see Chapter 6), which are spread out within New Zealand, these contaminated used vehicles and sea containers have the potential to introduce unwanted pest and organisms into a wide range of regions, some of which are remote and could be considered more vulnerable to invasion. The organisms that contaminate the used vehicles and containers, such as the painted apple moth (Anon. 2002d), red fire ants (Anon. 2002e), spiders (Anon. 2002b) and mosquitoes (Anon. 2002c) have the potential to negatively impact on both

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<sup>79</sup> <http://www.maf.govt.nz/quarantine/cargo/ap-expiry-dates.xls> 27-02-2007

the environment as well as public health (Anon. 2002f). Organisms that are considered to be biosecurity risks associated with woodpackaging and bark such as insect and fungi species have the potential to detrimentally impacting on plantation forestry as well as other primary industries and native flora (Bulman 1992, Simberloff 2005, Simberloff *et al.* 2005, Work *et al.* 2005). Given the isolation and distribution of these 7,000 points of entry (Chapter 6), management of possible incursions becomes very difficult and more expensive (Stephenson *et al.* 2003).

This study showed that increasing the accuracy of the inspections strongly influences the total slippage rate along the three importation pathways (Chapter 7). Increasing the inspection accuracy from the currently required 97% to the ideal 100% reduced overall slippage to 0.001% of all used vehicles and 0.5% of all sea containers entering New Zealand. A slippage of 0.001% of approximately 200,000 used vehicles imported annually is only 2 vehicles and 0.5% slippage along the sea container pathway is 1,639 containers annually. However, given the size and the number of sea containers imported, the variety and volume of their contents and the number of used vehicles entering New Zealand annually, 100% inspection accuracy is considered an unrealistic target (Anon. 2003i, 2006d). Therefore, the simulations assessed the slippage rate with inspection accuracy higher than that presently expected (97%) but less than the ideal 100% (Chapter 7). The results show that even increasing the inspection accuracy by one percent the total slippage decreased to 0.5% and 1.75% per year for used vehicles and sea containers respectively.

The Biosecurity Act (1993) has through a series of IHS provided the private sector with the means to import the units and transport them along specified routes to specific locations to be inspected in a prescribe manner by a MAF accredited person (Chapter 5 and 6). Should the units be contaminated, the recording and specific treatments are also prescribed by the relevant IHS. In order to increase the current inspection efficiency, careful consideration must be given to the requirements of the international agreements the New Zealand Government is party to as well as to the existing infrastructure, the availability of resources and to the effectiveness of any proposed change to the existing system. The international agreements require an unbiased system where all importation measures that exceed those of the international standards are based on scientific evidence (Chapter 4). By introducing specific

inspection requirements unilaterally to all units imported the system remains unbiased. In New Zealand, the existing infrastructure is flexible and constantly changing, as transitional facilities are reviewed annually (Chapter 6), and this study showed that an increase in inspection efficiency would improve the existing system (Chapter 7).

A major assumption of this study is that inspection efficiency is a direct result of adequate training and experience of those persons that are conducting the inspections and the time taken for each inspection (Chapters 7 and 8). It was also assumed that MAF inspectors received the adequate training and gain sufficient experience so that they are capable of inspecting all imported units accurately given sufficient time for inspection. This study theorises that requiring all units imported to be inspected and all inspections be conducted by MAF inspectors will have minimal impact on the international agreements as this requirement would be unbiased and does not further impact the commodity trade or the origin of the commodity. Given that all sea containers are already to be inspected upon arrival and that all used vehicles without pre-shipment management and all woodpackaging material without ISPM 15 are to be inspected, requiring all imported units to be inspected is not considered to be a major change to the current system and will have minimal impact on the New Zealand Governments international commitments. It is also considered that who conducts the required inspection is a national issue that will not create biased importation requirements.

#### **9.4 The Cost of Managing New Zealand's Biosecurity**

In the budget for 2005-06, the New Zealand Government allocated approximately \$157.315 million for Biosecurity, of which 95% (\$149.239 million) was allocated to MAF. The other 5% was allocated to the Ministry of Health for managing the public health aspects of New Zealand's biosecurity. In addition to Governmental funding MAF is expected to recover costs expended on biosecurity measures as outlined in Biosecurity (Costs) Regulations (1995) (Chapter 6 and Appendix V). In a recent study, MAF estimated that the cost of biosecurity compliance for importers to be between 0.9-1.4% of the total value of the 'risk goods' imported, or between \$81 million to \$125 million per annum (Anon. 2005). Importers are responsible for the

costs of completing biosecurity clearance for all imported commodities and packaging (Chapter 6 and 8). Such costs include:

- Setting up and maintaining transitional facilities,
- Training of personnel to become MAF accredited inspectors,
- Providing the relevant documentation and the inspection of the provided documentation by MAF personnel,
- Inspections at transitional facilities,
- Inspection of commodities or packaging by a MAF inspector should one be required,
- Treatments if required, both pre-shipment and at border,
- Re-inspections,
- The auditing of the transitional facilities by MAF at regular intervals.

MAF estimates that importers or other third parties funded approximately 93% (\$20.6 million) of the cost of cargo biosecurity clearance services provided by MAF in 2005-06 (Anon. 2006a). In 2006 the MAF Quarantine Service (MAFQS) had 178 full time inspectors (totalling 258,100 chargeable hours per annum) that conducted the majority of the tasks subject to the cost recovery in the regulations (Anon. 2006e). This limited number of inspectors throughout New Zealand may account in part for the reported inconsistencies within the management of the sea container pathway (pers. com. public MAF meeting 2005 and pers. com. Anon. 2005). In 2006, the Auditor General's Office also highlighted the inconsistent enforcement of regular audits of transitional facilities and the inconsistent level of prosecutions when requirements are not met throughout New Zealand (Anon. 2006d). It is this inconsistency in practice and unstable regulations that contribute to the increase of the overall cost of biosecurity compliance for industry (Anon. 2005). It is important to note that resource requirements and allocations (for border management) do not solely depend on the overall volume of goods moved, but also on the number of different points of entry, peaks in patterns of delivery and by the changes in the biosecurity risks associated with the different pathways or points of origin (Pinfield 2001).

The costs associated with each inspection type (Anon. 2006a, e) are a reflection of the time and resources needed for a MAF inspector to conduct an inspection. It is

interesting to note that MAF estimates that the time taken for inspecting used vehicles is approximately 9 minutes for used motor cars and motor vehicles (not exceeding 3,500kg) and 21.6 minutes for used heavy motor vehicles (weight exceeding 3,500kg) (Anon. 2006e). Upon consulting with companies within the importing industry, biosecurity clearance procedures for sea containers themselves (including inspection and decontamination if required) takes between 40-60 minutes, while the procedures for FCL or LCL can take between 1-8 hours depending on the commodities within the sea container (pers. com. Anon. source 1 2005).

In 2006 MAF adjusted the hourly rate of inspectors associated with sea containers and used vehicles under the premise of making the cost recovery more accurate and ensuring that any changes in practice required at the border are covered under the cost recovery system (Anon. 2006a). These changes were made in consultation with the public and interested parties through public meetings and submissions. The review of recoverable cost was initiated when the forecast for 2005/2006 under 2003 regulations showed a revenue deficit for MAF operating expenditure of \$1.4 million. The changes implemented in 2006 projected an increase in revenue from importers of \$3.5 million to \$22.7 million resulting in a forecast of a \$1.1 million operations expenditure surplus (Anon. 2006a). The cost of MAF inspections of sea containers was increased from \$50 to \$98 per hour to more accurately reflect the actual cost for an inspection conducted by a MAF inspector. In contrast, the cost associated with the inspection of used vehicles decreased under the new regulations, reducing the cost per inspection from \$50 to \$25 (Anon. 2006e).

The models developed in this study showed that inspection accuracy was the most critical management aspect to affect slippage in the importation of sea containers and their contents and used vehicles (Chapter 7). Therefore, the economic models used in this study assessed the cost of inspections to the importers if MAF inspectors inspected all imported containers and used vehicles (Chapter 8). The models predicted total recoverable costs (i.e. the cost to importers) for inspecting used vehicles and sea containers in 2006 of \$5.44 and \$117.36 million respectively, given an estimated 193,210 used vehicles and 500,000 sea containers were imported. When the inspection accuracy was increased from the 97% currently expected to the ideal



100% the predicted recoverable costs increased by 61.92%, 75.36% and 61.96% for used vehicles, sea containers and woodpackaging respectively.

This study proposes that MAF inspectors are sufficiently trained and experienced to provide the required increase in accuracy of inspections. The study therefore also assessed the cost of MAF inspectors inspecting all units imported along the three pathways. As the sheer volume of units imported still exceeds the traditional infrastructure at the sea and airports, transitional facilities or similar infrastructures are still required. However, the manner in which the transitional facilities are established, managed and audited is policy driven and is flexible. As such, in order to increase the efficiency of inspections as estimated by this study, Government policy will need to be changed in such a manner as to remove the ability for non-MAF staff to conduct inspections of all imported units at the transitional facilities.

### **9.5 Potential Technology to Aid with Inspections or Managing Slippage**

In addition to ensuring that inspections are conducted by trained and experienced personnel in the time required to be accurate, there have been advances in technology to aid with inspections. In 2003 the Sea Container Review evaluated methods and tools/equipment to aid in the inspection and treatment of sea containers and their contents. As part of the survey, inspectors tested a probe camera on a pole at door inspections and while the trial was not proven to be statistically significant, the camera did increase the rate of detecting woodpackaging within sea containers. The Review also examined other potential inspections aid such as Electronic Sniffer Technology, which can be used to detect snakes and spiders (equipment used to measure changes in CO<sub>2</sub> within containers, similar technology to that used by border control officers to detect illegal immigrants in the USA), Automatic Container Washing Machines, which can be used to dislodge eggs clusters and other contaminants from external surfaces of sea containers and heat treatments, which involve subjecting the container to higher temperatures than most insects can survive (Anon. 2003i). However, the review concluded that these aids were not practical to be implemented and not suitable for all units imported, and their cost of establishing and operating was not considered to be offset by the benefits.

## 9.6 The Cost of Prevention Vs the Cost of Management

With regard to the cost of managing New Zealand's biosecurity, it is important to consider the cost of prevention in relation to the cost (economically and environmentally) with no or limited prevention. This study estimated that to improve the prevention of invasive species entering New Zealand requires the cost to the private sector to increase by between 60-90%. However, the cost (economically and environmental) of invasive species successfully establishing in New Zealand has the potential to be far reaching and in most cases irreversible (species extinction and ecosystem loss) (Costello *et al.* 2007). Although the true cost of invasive species is difficult to measure, some studies have attempted it. Pimentel *et al.* (2000 and 2006) estimated that the 50,000 known invasive species in the United States of America have cost in excess of \$US120 billion, in terms of environmental damage and losses they are estimated to have caused. The absolute impact that invasive species have had on New Zealand's economic and environmental health has not been quantified in dollars and this is an area for future research.

This study has highlighted information gaps that are areas for potential future research; these include taking steps to estimate the financial impacts the invasive species already present in New Zealand have had and are continuing to have on New Zealand's economy, conducting detailed studies into how the inspections of different commodities and vessels can be improved on an operational level and investigate the specific policy amendments or restructuring of the existing border management system that would enable all inspections to be conducted by MAF.

The majority of importers see the compliance with biosecurity procedures as a part of their normal business, integrating it in such a manner to reduce their costs where possible and factor them into the price of products for the consumer. Among the industry there is also an understanding that biosecurity measures are there for the protection of the long term sustainability of their businesses (Anon. 2005, Anon Source 1 2005).

# Chapter 10

## Conclusion and Management Implications

The very act of trading creates the risk of introducing species into new environments and with international trade increasing all trading nations need to be vigilant in order to minimize the spread of unwanted pests and diseases. As New Zealand depends on trade for its prosperity, New Zealand is party to international trade agreements that seek to achieve a balance between limiting the spread of potentially invasive species and facilitating trade (Anon. 2003a). In trying to achieve this balance, international agreements aim to harmonise international standards for the transport of commodities, persons and vessels by requiring scientific evidence for limiting the movement of goods (Anon. 2003a, WTO 2003). In conjunction with international agreements such as the GATT (1994) and SPS (1995), New Zealand has developed domestic legislation (e.g. the Biosecurity Act (1993) and subsequent importation regulations) that prescribe the requirements for the importation of commodities, persons and vessels into New Zealand. Despite both international and domestic legislation, invasive species are still being introduced into New Zealand (Bulman 1992, Anon. 2002d, Ridley 2003, Hewitt *et al.* 2004).

Trading creates the risk of introducing invasive species by establishing both physical pathways (e.g. the movement of commodities via the sea containers) and physical vectors (e.g. the commodities harbour or transport invasive species). The specific pathways along which invasive species are transported are not easily detected given the vast volume and the variety of commodities moved (Green 2000). However, there have been cases, where the incursion of an invasive species has been directly linked to specific pathways. For example, the importation of the painted apple moth along the used vehicle pathway (Anon. 2002d), the black widow spider on Californian table grapes (Anon. 2002b) and wood boring insects on wood products (Haack 2006).

Given the risks associated with international trade are numerous and in cases unforeseeable, the goal for biosecurity is implementing effective management

procedures that ensure an acceptable level of risk prevention is achieved and maintained. The thesis of this study was to assess New Zealand's management procedures for specific aspects of three importation pathways (the sea containers and associated woodpackaging material, and used vehicles), and to provide an in-depth analysis of possible management solutions with risk assessment based models.

The findings of this study showed that altering the current management procedures affected the rate at which contamination passed through New Zealand's biosecurity related border management (slippage) along all three pathways. The developed models estimated that under current regulations approximately 5.75% of all sea containers, 4.12% of all sea containers containing woodpackaging and 1.63 % of all used vehicles that enter New Zealand annually are contaminated although they have been given biosecurity clearance. The sensitivity analyses showed that although altering management procedures (including pre-border and border) had an effect on slippage, the accuracy of the inspection had the strongest influence on slippage along all three pathways (Chapter 7). Increasing the inspection accuracy by 3% decreased slippage to 0.5% for all sea containers, to 2.16% for sea containers containing woodpackaging and to 0.001% for all used vehicles imported annually.

As the accuracy of the inspections was the most influential aspect of the border management procedures, the study estimated the cost of biosecurity compliance if Ministry of Agriculture and Forestry (MAF) inspectors inspected every unit imported. Under current regulations the cost of compliance relating to inspections (if MAF inspectors conducted all inspections) was estimated to be \$117.36 million for the sea container pathway, \$35.16 million for the woodpackaging pathway and \$5.44 million for the used vehicle pathway. To achieve the desired reduction in slippage the cost of compliance to the importers was estimated to increase by 60-90% (Chapter 8) to \$205.81m for sea containers, \$92.34m for wood packaging and \$14.28m per annum for used vehicles. However, due to the information available, these models did not factor in the possibility of a plateau or maximum level of imports of sea container and used vehicles. Therefore these findings should be considered preliminary and be treated with caution.

The development of transitional facilities under the BSA (1993) (Chapter 6) has enabled MAF to implement a six-sided sea container inspection policy with minimal disruption to trade. These transitional facilities, some 7,000, are distributed throughout New Zealand and are classed as points of entry. However, these facilities increase the potential impact of incursions as some of them are in remote and vulnerable areas, where the introduction of an invasive species can have a devastating impact on indigenous flora and fauna. Despite the potential for severe negative environmental impacts these facilities, if sufficiently managed, provide New Zealand with the ability to ensure a level of biosecurity protection that is deemed acceptable by MAF.

Considering New Zealand's international obligations under the WTO and FAO any changes made to regulations that affect or limit the movement of goods are to be supported by scientific evidence (Chapter 4). Altering management procedures such as compulsory pre-shipment inspection or treatment have ramifications for the countries exporting to New Zealand and therefore New Zealand's international obligations. However, how imported units such as sea containers or used vehicles are inspected upon arriving in New Zealand is a matter of domestic regulation (Chapter 5) that should have limited ramifications on any international agreement New Zealand is party to.

## **10.1 Management Implications**

Since 2003 MAF has been accountable for the majority of the management of the New Zealand's Government Biosecurity programme and in 2004 the biosecurity activities conducted by the Ministry of Fisheries were also transferred to MAF, establishing MAF as the lead governmental agency responsible for the end to end management of New Zealand's biosecurity<sup>80</sup>. In recent audits and reviews, the processes with which MAF manages New Zealand's border management and biosecurity have come under scrutiny (Anon. 2000, Anon. 2002b, c, d, e, f, g, Anon. 2003i, Anon. 2006d). The reviews and audits have highlighted inconsistencies with enforcement of importation regulations, such as the auditing of transitional facilities,

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<sup>80</sup> <http://www.biosecurity.govt.nz/bio-strategy/strategic-unit/biosecurity-system.htm> 08-03-2007

prosecution of infringements and the development and implementation of review import health standards (Anon. 2003i, Anon. 2006d). Recent studies have also highlighted that sea containers and their contents pose a major biosecurity risk to New Zealand and made recommendations to rectify any inconsistencies found (Anon. 2003i, Anon. 2006d, Green 2000). The Sea Container Review (2003) recommended enhancing the knowledge of the public and industry regarding biosecurity information, increasing the use of compulsory offshore certification of imported commodities, harmonising international standards in relation to the shipment of cargo, developing a more sophisticated electronic database shared between government agencies and a six-sided inspection of sea containers (which has since been implemented) (Chapter 1).

The findings of this study indicate that the accuracy of the inspection at the border appeared to have the greatest influence on the amount of contamination entering New Zealand. As the majority of these inspections are currently being conducted by accredited person at transitional facilities throughout New Zealand, this study concludes that if inspections are conducted by MAF inspectors or personnel with sufficient training and experience the accuracy of inspections will increase and slippage will decrease. In order to increase the inspection efficiency the New Zealand Government will have to make policy decisions that will restrict how imported units are inspected including what units are inspected and who inspects them. Implementing compulsory border inspections by MAF inspectors (sufficiently trained and experienced) will require MAF to strategically invest (employ and train) in personnel to conduct inspections. Although this study's findings indicate that ensuring that MAF inspectors conduct inspections will reduce slippage, investigating the specific policy amendments or restructuring of the existing border management system that would enable all inspections to be conducted by MAF is outside the scope of this study; these are topics for further research.

Taking into account the Biosecurity (Costs) Regulations (2005), the investment by the New Zealand Government into the training of these accredited persons or the employment of more than the current 178 MAF inspectors has the potential to significantly reduce the risk of incursion, and the cost of the actual inspections would be recoverable. In addition, increasing the number of MAF inspectors throughout

New Zealand would not effect New Zealand's international trade obligations, nor would it involve any major restructuring of current regulations and procedures. Increasing the number of MAF inspectors may also have the benefit of further reducing biosecurity risk by reducing the risk of dishonest operators from failing to sufficiently inspect and report contamination in order to reduce operating costs and increase productivity.

Although this study showed that inspection was the most pertinent management procedure along the assessed pathways, achieving an acceptable level of protection is obtained through the integrated management of both pre-border and border procedures (Smith and Clough 2000, Anon. 2003i). This includes the treatment of commodities to ensure the known associated risks are minimised (such as heat treatment of woodpackaging (Rapp 2001), the correct treatment and storage of California table grapes (Anon. 2002b)).

Recent international studies into the prevention of the spread of invasive species have highlighted that despite the best intentions of international agreements, domestic legislation and regulations, the major limiting factors in preventing the spread of invasive species are politics and funding along with insufficient knowledge (Simberloff 2005, Simberloff *et al.* 2005). Given the emphasis placed on the prevention of the spread of invasive species both internationally and domestically, a greater level of resources allocated to the protection of unique ecosystems such as New Zealand is required (Simberloff 2005). In addition to the investment of intensifying the training of inspectors, greater resource allocation for research into the risks posed by trade and into possible technologies for identification and detection of biosecurity risks or invasive species can only aid in the race to achieve the desired level of biosecurity promoted by scientists (Green 2000, Ridley 2003) and the New Zealand Government (Anon. 2002g, 2006d).

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## Glossary

<b>Accredited Person</b>	A person who has attended and passed a course in basic MAF biosecurity awareness.
<b>Approved</b>	Approved by the Director-General MAF, or delegate, for the intended purpose.
<b>Biosecurity clearance</b>	A clearance under section 26 of the BSA 1993 for the entry of goods into New Zealand.
<b>Biosecurity Control Area</b>	A place that is a part of a port approved as a place of first arrival in accordance with section 37(1) or by written agreement with the Director-General for the purposes of the BSA 1993.
<b>Consignment</b>	Any unaccompanied goods covered by one bill of lading, imported by one imported, on one conveyance, at one time.
<b>Container</b>	A sea freight container built to specifications promulgated by the International Organisation for Standardisation or similar structure.
<b>Contamination</b>	Animals, insects or other invertebrates (alive or dead, in any life cycle stage including egg casing or rafts), or any organic material of animal origin (including blood, bones, hair, flesh, secretion, excretion), viable or unviable plants or plant products (including fruit, seeds, leaves, twigs, roots, bark) or other organic material including fungi; or soil or water; where such products are not the manifested cargo being imported.
<b>Conveyance</b>	Any craft, truck, cargo container, horse-box, wagon, cart, dray, cage, kennel, or vehicle that is or has been used for the conveyance of, or has been come into contact with, any organism or organic material.
<b>Craft</b>	Any aircraft, ship, boat, or other machine or vessel used or able to be used for the transportation of people or goods, or both, by air or sea
<b>CusMod</b>	The New Zealand Customs Service database used to issue holds and releases for imported consignments
<b>Declarant</b>	The person, generally an importer or import's agent, who makes the electronic declaration into CusMod using an import entry or ECI report.



<b>Devan</b>	The process of fully unpacking a container's contents.
<b>Door inspection</b>	Visual inspection of what can be seen of the internal state of a container when the door is opened, without removing goods from the container.
<b>Dunnage</b>	Material (often wood) used to secure or support a commodity but which does not remain associated with the commodity (based on FAO 2002a).
<b>ECI report</b>	A report generated through the web-based Electronic Cargo Information (ECI) New Zealand Customs Service interface.
<b>Exporter</b>	The person or company who supplies the goods for export.
<b>External inspection</b>	Inspection of the external sides (generally 4) of a container.
<b>FAK</b>	Freight of all kinds – goods for multiple consignees within a single container, devanned at an off-wharf facility.
<b>FAO</b>	The Food and Agriculture Organization of the United Nations.
<b>FCL</b>	Full container load – generally a container with goods for a single Consignee
<b>High Risk Container</b>	Containers which have a higher risk than average probability of being contaminated or carrying unmanifested or prohibited packaging material, or those without a complaint quarantine declaration.
<b>IHS</b>	Import Health Standard – a document specifying the requirements to be met for the effective management of risks associated with the importation of risk goods (such as sea containers).
<b>Import Entry</b>	an electronic declaration made by a customs broker or freight forwarder in CusMod which relates to an individual consignment that has been imported
<b>Importer</b>	The person or company who imports goods.
<b>Incursion</b>	The establishment of a species within an area previously un-inhabited by the species aided by the activities of humans.

<b>Inspection</b>	A visual inspection by an inspector of sufficient thoroughness to detect the presence of insects and other contaminants that can be seen on or in the container.
<b>Inspector</b>	A person appointed under section 103 of the BSA 1993.
<b>LCL</b>	Less than a container load – a container with goods consolidated for multiple consignees.
<b>Non-Compliance</b>	the absence if a quarantine declaration (or equivalent system) or un-notified presence of internal or external contamination, unmanifested wooden packaging material, prohibited packaging material or non-clean wooden packaging
<b>Manifest</b>	A document describing the contents of a container (cargo and packaging), the importer and/or agent, vessel and port of arrival, and in some cases, certification or treatments that have been applied to the container.
<b>Packaging</b>	Packing material of the cargo within the container such as cases, boxes, drums, and carton, as well as material used to stabilise cargo within container such as dunnage.
<b>Quarantine Declaration</b>	Is a declaration attesting to the interior and exterior cleanliness of the container and whether any restricted packing or packaging is used within the cargo or container.
<b>Transitional Facility</b>	A place approved as a transition facility in accordance with section 39 of the BSA 1993 for the purpose of inspection, storage, treatment, quarantine or holding of containers

# List of Legislation

<b>Legislation</b>	<b>Date</b>
<b>Domestic</b>	
Alcoholic Liquor Advisory Council Act	1976
Anti Personnel Mines Prohibition Act	1998
Arms Act	1983
Biosecurity Act	1993
Children, Young Persons & Their Families Act	1989
Commerce Act	1986
Companies Act	1993
Conversation Act	1987
Copyright Act	1994
Crimes Act	1961
Customs and Excise Act	1996
Customs and Excise Regulations	1996
Diplomatic Privileges and Immunities Act	1968
Dumping and Countervailing Duties Act	1988
Evidence Act	1908
Fair Trading Act	1986
Films, Videos, and Publications Classification Act	1993
Financial Transaction Reporting Act	1996
Goods and Services Tax Act	1985
Hazardous Substances and New Organisms Act	1996
Human Assisted Reproductive Technology Act	2004
Immigration Act	1987
Import Control Act	1988
Maritime Transport Act	1994
Medicines Act	1981
Mercantile Law Act	1908
Misuse of Drugs Act	1975
New Zealand Bill of Rights Act	1990
Official Information Act	1982

Ozone Layer Protection Act	1996
Passport Act	1992
Postal Services Act	1998
Privacy Act	1993
Public Finance Act	1989
State Sector Act	1988
Statistics Act	1975
Tariff Act	1988
Telecommunications Act	2001
Temporary Safeguard Authorities Act	1987
Trade in Endangered Species Act	1989
Trade Marks Act	2002
Wine Makers Act	1981

**International**

Sanitary and Phytosanitary Agreement	1995
General Agreement on Trade and Tariffs	1947
	1994
International standards for Phytosanitary measures the	
International Plant Protection Convention	1952

# List of Equations

## The Used Vehicle Model Equations:

$$d1 = (T - (T \times A1)) \times (1 - b1) \times (d)$$

$$d2 = (T - (T \times A1)) \times (b1) \times (d) \times (1 - e)$$

$$d3 = [(((T \times A1) - (T \times A1 \times B1)) \times a2) - (((T \times A1) - (T \times A1 \times B1)) \times (a2) \times (b2))] \times (d)$$

$$d4 = ((T \times A1) - (T \times A1 \times B1)) \times (a1) \times (b2) \times (1 - e)$$

$$d5 = ((T \times A1) - (T \times A1 \times B1)) \times (1 - a2) \times (d)$$

$$d6 = ((T \times A1 \times B1 \times a3) - (T \times A1 \times B1 \times a3 \times b3)) \times (d)$$

$$d7 = (T \times A1 \times B1 \times a3 \times b3) \times (1 - e)$$

$$d8 = (T \times A1) \times (B1) \times (1 - a3) \times (d)$$

## The Sea Container Model Equations

$$d1 = T \times A \times B \times C \times E$$

$$d2 = ((T \times A) - (T \times A \times B \times)) \times D$$

$$d3 = T \times a \times b \times c \times e$$

$$d4 = (T \times a) - (T \times a \times b) \times d$$

**The Woodpackaging and Bark Model equations:**

$$da = T \times A \times B \times a1 \times b \times f \times e2$$

$$da(bark) = (T \times A \times B \times a1 \times b \times f \times e2) \times (C)$$

$$d1 = ((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) \times e2 \times c1 \times e$$

$$d1(bark) = (((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) \times e2 \times c1 \times e) \times (C)$$

$$d2 = ((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) - (((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) \times e2) \times d$$

$$d2(bark) = ((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) - (((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) \times e2) \times d$$

$$d3 = ((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) \times e2 \times c2 \times e$$

$$d3(bark) = (((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) \times e2 \times c2 \times e) \times (C)$$

$$db = (1 - c1) \times (((T \times A \times B \times a1 \times b) - (T \times A \times B \times a1 \times b \times f)) \times e2)$$

$$d4 = (((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) - (((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) \times e2) \times d$$

$$d4(bark) = (((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) - (((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) \times e2) \times d) \times (C)$$

$$dc = (1 - c1) \times (((T \times A \times B \times a1) - (T \times A \times B \times a1 \times b)) \times e2)$$

$$d5 = ((T \times A \times B) - (T \times A \times B \times a1)) \times ep$$

$$d6 = ((T \times A) - (T \times A \times B)) \times a2 \times e$$

$$d6(bark) = (((T \times A) - (T \times A \times B)) \times a2 \times e) \times (C)$$

$$d7 = (((T \times A) - (T \times A \times B)) - (((T \times A) - (T \times A \times B)) \times a2)) \times ep$$

# Biosecurity (Costs) Regulations 2006

## Schedule: Costs Payable for Activities

Item	Function, power, or duty for which Costs costs are payable	Costs payable by
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### *Inspection at International Mail Centre*

- |   |  |   |
|---|--|---|
| 1 | <p>Inspection of goods (other than goods imported for the personal use of the importer) at the International Mail Centre, involved for the purpose of ascertaining whether or not those goods should be cleared.</p>   | <p>\$100.00 per hour for Importer. each general inspector involved.</p>   |
| 2 | <p>Tests, examinations, and treatments of imported goods, that harbour, or may harbour, an organism, that are—</p> <p>(a) carried out by the Ministry's Quarantine Service; and</p> <p>(b) necessary to identify the organism, so as to enable an inspector to decide whether the goods should—</p> <p style="padding-left: 20px;">(i) be cleared; or</p> <p style="padding-left: 20px;">(ii) be moved from a transitional facility to a containment facility; or</p> <p style="padding-left: 20px;">(iii) continue to be held in a transitional or containment facility (as the case may be).</p> | <p>\$100.00 per hour for Importer. each general inspector involved; and actual and reasonable costs of the tests, examinations, and treatments.</p> |
| 3 | <p>Surveillance of discharge of goods, for the purpose of ascertaining whether or not the goods should be cleared.</p>   | <p>\$100.00 per hour for Importer. each general inspector involved.</p>   |

*Inspection of shipping containers and offshore craft*

- 4 Inspection of a shipping container that does not meet entry requirements. \$100.00 per hour for Importer, or any other person (including the person's or importer's agent), who transports the shipping container by ship. each general inspector involved.
- 5 Inspection of a craft located offshore, for the purpose of determining whether the craft contains any organism that poses a threat to the biosecurity of New Zealand. \$100.00 per hour for Operator of the craft. each general inspector involved.

*Inspection of motorcycles, mopeds, and motor vehicles*

- 6 Inspection, and each re-inspection after treatment, of a consignment, of a single used motorcycle or moped, for the purpose of ascertaining whether or not the consignment should be cleared. \$15.00 per motorcycle Importer.
- 7 Inspection, and each re-inspection after treatment, of a consignment, of a single used motor vehicle having a gross laden weight not exceeding 3 500 kg (other than a motorcycle or moped), for the purpose of ascertaining whether or not the consignment should be cleared. \$25.00 per motor Importer.
- 8 Inspection, and each re-inspection after treatment, of a consignment, of a single used motor vehicle having a gross laden weight exceeding 3 500 kg, for the purpose of ascertaining whether or not the consignment should be cleared. \$50.00 per motor Importer.

*Inspection of goods not prescribed elsewhere in Schedule*

- 9 Inspection, and each re-inspection after treatment, of any goods that are required to be inspected under the Act for the purpose of ascertaining whether or not the goods should be cleared, and for which costs are not prescribed elsewhere in the Schedule. \$100.00 per hour for Importer. each general inspector involved.



*Monitoring controls on new organisms and inspection of animals or animal material*

- 10 Monitoring controls on new organisms in containment facilities. \$100.00 per hour for each general inspector approval (issued under the involved; and \$96.10 for Hazardous Substances and each veterinary New Organisms Act 1996) inspector involved. to import the organism into containment, or to hold the organism in containment; or (where there is no approval) the importer or owner of the organism or the goods that harbour the organism.
- 11 Inspection of an animal that is intended to be cleared, or directed to a transitional or containment facility, on arrival. \$28.70 per animal. Importer.
- 12 Inspection of an animal that— \$100.00 per hour for each general inspector involved; and \$96.10 per hour for each veterinary inspector involved.
- (a) is on board a craft within New Zealand territory; and
- (b) is not intended to be cleared.
- 13 Inspection and monitoring of an animal held in a transitional or containment facility, for the purpose of ascertaining whether the animal should— \$100.00 per hour for each general inspector involved; and \$96.10 per hour for each veterinary inspector involved.
- (a) be cleared; or
- “ (b) be moved from a transitional facility to a containment facility; or
- (c) continue to be held in a

transitional or containment  
facility, as the case may be.

- 14 Inspection of a consignment of animal material (other than fish meal), for the purpose of ascertaining whether or not it should be cleared. \$28.70 for each Importer. samples that are not veterinary medicines, biological products, or agricultural compounds; and \$57.40 for each consignment in every other case.

*Inspection and monitoring of plant*

- 15 Inspection and monitoring of a plant, held in a transitional or containment facility, each general inspector for the purpose of ascertaining whether it should— \$100.00 per hour for Importer.
- (a) be cleared; or
  - (b) be moved from a transitional facility to a containment facility; or
  - (c) continue to be held in a transitional or containment facility, as the case may be.

*Treatment, destruction, or disposal of risk goods*

- 16 Treatment, before being cleared, of risk goods imported— Actual and reasonable costs of the treatment: and any costs of packaging, storing, forwarding, and returning the goods before and after treatment. Importer.
- (a) in a person's baggage (whether or not the baggage is accompanied); or
  - (b) through the mail; or

(c) among personal effects.

- |    |   |  |
|----|---|--|
| 17 | Treatment of imported risk goods, other than risk goods specified in item 16 of the Schedule        | Actual and reasonable Importer. costs of treatment; and any costs of packaging, storing, forwarding, and returning the goods before and after treatment. |
| 18 | Destruction, transportation, reshipment, or other disposal of goods.                                | Actual and reasonable Importer. costs of destruction, transportation, reshipment, or other disposal.   |
| 19 | Supervising, or advising on, destruction, transportation, reshipment, or other disposal of goods. . | \$100.00 per hour for Importer. each general inspector and biosecurity adviser involved; and \$96.10 per hour for each veterinary inspector involved     |

*Permits issued under import health standards*

- |    |  |   |
|----|--|---|
| 20 | Processing an application for a permit under import health standards.                        | \$105.00 for each Applicant. application processed. |
| 21 | Processing an application for an amendment to a permit issued under import health standards. | \$105.00 for each Applicant. application processed. |

*Transitional and containment facilities*

- |    |   |  |
|----|---|--|
| 22 | Processing an application for approval of a transitional or containment facility. | \$100.00 per hour for Applicant. each general inspector and biosecurity adviser involved; and \$96.10 per hour for each veterinary inspector involved. |
| 23 | Inspecting and compliance auditing of a transitional or containment facility, to  | \$100.00 per hour for Applicant or facility operator (as the case may  |

- ascertained whether or not it should be and biosecurity adviser be).  
 approved, or continue to be approved, involved; and \$96.10  
 under section 39 of the Act. per hour for each  
 veterinary inspector  
 involved.
- 24 Processing an application for approval as \$100.00 per hour for Applicant.  
 a facility operator. each general inspector  
 and biosecurity adviser  
 involved; and \$96.10  
 per hour for each  
 veterinary inspector  
 involved.
- 25 Investigating and compliance auditing of \$100.00 per hour for Applicant or facility  
 a facility operator, or proposed operator, each general inspector operator (as the case may  
 to ascertain whether or not the operator or and biosecurity adviser be).  
 proposed operator should be approved, or involved; and \$96.10  
 continue to be approved, under section 40 per hour for each  
 of the Act. veterinary inspector  
 involved.

*Functions, powers, and duties not prescribed elsewhere in Schedule*

- 26 Performing a function, power, or duty— . \$100.00 per hour for Person whose actions  
 each general inspector result in the function being  
 and biosecurity adviser required  
 involved; and \$96.10 for  
 each veterinary  
 inspector involved.

(a) required to be undertaken under the  
 Act; and

(b) not prescribed elsewhere in the  
 Schedule.